FIRE MANAGEMENT PLAN

for

WILSON'S CREEK NATIONAL BATTLEFIELD

United States Department of the Interior
National Park Service
Wilson's Creek National Battlefield
Republic, Missouri

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Wilson's Creek National Battlefield

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I. INTRODUCTION

E. A. REQUIREMENTS

Wilson's Creek National Battlefield is about 10 miles south of the city of Springfield, Missouri, on the boundary between Greene and Christian Counties in the southwestern corner of the state. The park encompasses 1,750 acres, which includes 75% of the actual battlefield. The park was established on April 22, 1960, in order to preserve and commemorate the Battle of Wilson's Creek, the site of the second battle of the Civil War and the first major battle west of the Mississippi River.

The Fire Management Plan (FMP) is an addendum to Wilson's Creek National Battlefield's Resource Management Plan. This plan outlines a detailed program of actions to be taken by Wilson's Creek National Battlefield (the Battlefield) to meet the fire management goals for the area.

The plan is also guided by Director's Order-18 (DO-18) which requires that all park units with vegetation capable of sustaining fire develop a FMP. Until a FMP is approved, the Battlefield will aggressively suppress all wildland fires, taking into account the safety of firefighting personnel, the visiting public and protection of all resources at risk on the unit.

E. B. OBJECTIVES TO ACHIEVE

Overall resource management objectives for the Battlefield guide the FMP. Resource management objectives determine whether fire may be utilized as a tool to manage vegetation.

The FMP will implement activities in accordance with the regulations and directions governing the protection of historic and cultural properties as outlined in the Department of Interior Manual, Part 519 (519 DM), and Code of Federal Regulations (36 CFR 800). The National Historic Preservation Act of 1966 (NHPA), as amended, particularly Section 106, sets the requirements for the protection of the historic properties found on the unit.

E. C. NEPA AND OTHER COMPLIANCE

An Environmental Assessment (EA) guides the FMP and complies with National Environmental Policy Act (NEPA) requirements and National Park Service (NPS) policy. The completed EA analyzes environmental impacts of the operations detailed in this plan. A copy of the Finding of No Significant Impact is located in Appendix D after compliance is completed.

Initial scoping was completed prior to the public review stage. Consultation with interested parties such as the State Historic Preservation Officer, Native American Indian Tribes, and U.S. Fish and Wildlife Service will be accomplished concurrently with the public review. Copies of responses received during the scoping phase have been included in Appendix D.

E. D. AUTHORITY FOR IMPLEMENTATION

The legal authority for the operation of the FMP is found in 16 U.S.C. Chapters 1 and 3. The specific authorities can be found in 620 DM 1.1. The Organic Act of the National Park Service (August 25, 1916, Section 102) provides the authority for implementation of this plan.

The authority for FIREPRO funding (Normal Fire Year Programming) and all emergency fire accounts is based on the following authorities:

1. Section 102

   General Provisions of the Department of the Interior's annual Appropriations Bill provides the authority under which appropriated monies can be expended or transferred to fund expenditures arising from the emergency prevention and suppression of wildland fire.

2. Public Law 101-121

   Department of the Interior and Related Agencies Appropriation Act of 1990 established the funding mechanism for normal year expenditures of funds for fire management purposes.

3. 31 USC 665 (E) (1) (B)

   Contains the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

II. NPS POLICY AND RELATION TO OTHER PLANS

E. A. 2001 FEDERAL FIRE MANAGEMENT POLICY

The 2001 Federal Fire Management Policy update addresses 17 distinct items, the foremost being safety; all Fire Management Plans and activities must reflect this commitment. The full text of the policy, Secretarial Transmittals, and Appendices may be found at (http://www.nifc.gov/fire_policy/index.htm).

This FMP is prepared to meet the policy requirements of Director's Order 18, Wildland Fire Management, dated December 31, 2003. In addition, preparation of this plan meets the requirements set forth in Department of Interior Manual 620 (620 DM) and the requirements of the Federal Fire Policy update of 2001.

E. B. RELATION TO ESTABLISHING AND OTHER LEGISLATION

1. National Park Service Establishment

The National Park System is comprised of more than 388 individual units administered by the National Park Service (NPS) for their intrinsic natural, cultural, and recreational values. There are four laws that constitute the primary authorities for administration of the National Park System. Under the 1916 NPS Organic Act, the NPS is charged with management of the parks to "... conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generation." (emphasis added)

The General Authorities Act of 1970 defined the National Park System as including all the areas administered by the NPS "... for park, monument, historic, parkway, recreational, or other purposes," and declared that all units in the System will be managed in accordance with their respective individual statutory directives, in addition to the Congressional direction found in the Organic Act and other relevant legislation, providing the general legislation does not conflict with specific provisions.

In 1978, in an act expanding Redwood National Park, NPS general authorities were further amended to specifically mandate that all park units be managed and protected "in light of the high public value and integrity of the National Park System" and that no activities should be undertaken "in derogation of the values and purposes for which these various areas have been established," except where specifically authorized by law.

Title II of the National Parks Omnibus Management Act of 1998 explicitly directs the National Park Service to use a broad program of the highest-quality science and information in managing and protecting units of the national park system.

2. Wilson's Creek National Battlefield Establishment

The enabling legislation establishing Wilson's Creek National Battlefield, Public Law 86-434, was passed by Congress on April 22, 1960. This law mandated the National Park Service to acquire the lands comprising the battlefield site and any adjacent lands

"…necessary or desirable to carry out the purposes of this Act…", and provided appropriations to do so. The law stated that the lands acquired under the Act "…shall be set aside as a public park for the benefit and enjoyment of the people of the United States." The law also directed the Park Service to make improvements including roads, trails, markers and buildings and other improvements deemed necessary "…for the care and accommodation of visitors."

In 1968 Secretary of the Interior Stewart Udall enclosed a memorandum from the chairman of the Advisory Board on National Parks Historic Sites, Buildings and Monuments endorsing a proposal to increase the development ceiling to **$2,285,000.** This memorandum stated that the Master plan should be implemented by developing the battlefield tour road and interpretive exhibits, by **restoring the historic scene**, and providing a visitor center.

In May 1970 Secretary of the Interior Fred T. Russell sent a letter to the chairman of the Committee on Interior and Insular Affairs, House of Representatives. This letter stated that **$2,514,000** was needed for **development** of the park. The letter identified the following development needs as tour road, interpretive exhibits, parking areas, trails, **restoring the historic scene**, and a visitor center with museum exhibits and administrative facilities. This letter was included in House Report HR1160.

In 1970 an amendment was passed to the enabling legislation. In addition to changing the formal designation of the site from (Wilson's Creek Battlefield National Park to Wilson's Creek National Battlefield), the amendment established increased appropriations for the park of **$2,285,000** for **development** of the Battlefield. Testimony supporting a need for additional funds to develop the site came from the Under Secretary of the Interior, who noted that the original Congressional authorization of $120,000 for park development had been used for an entrance road and a few administrative buildings. This, he said, was insufficient for proper development of the area, especially with the additional 1,727 acres that had been donated to the park by the State of Missouri. Money was needed for tour roads, interpretive exhibits, a visitor center, and other facilities "…essential to the visitor's enjoyment and understanding of the historic events which occurred at this site" (Hazelton, n.d.).

The legislative history of the park thus establishes its importance as an historic site, the natural beauty of the area, **the importance of restoring the historic scene**, and the need for adequate interpretation to support the purpose established by the enacting legislation of making the site available for the enjoyment and benefit of the public.

3. Federal Cave Resource Protection Act of 1988

This act states that: significant caves on Federal lands are an invaluable and irreplaceable part of the Nation's natural heritage; and in some instances, these significant caves are threatened due to improper use, increased recreational demand, urban spread, and a lack of specific statutory protection. The purposes of the act are: to secure, protect and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, education, or recreational purposes.

4. Historic Sites, Buildings and Antiquities Act and National Historic Preservation Act of 1966

   These two acts declared "a national policy to preserve for public use historic sites, buildings and objects of national significance...." The Historic Preservation Act requires that park managers identify and protect historic properties on lands under their management. Section 106 of this Act requires park managers to consult with the Advisory Council on Historic Preservation on actions that may affect properties included, or eligible for inclusion, in the National Register. Any proposed management action that may adversely affect a historic property at Wilson's Creek must be evaluated through the appropriate compliance procedures. The entire park is on the National List of Historic Properties. In addition there are 27 historic structures within the park that require protection and rehabilitation.

5. Endangered Species Act

   Wilson's Creek protects and manages habitat for one Federally endangered animal, Gray bat (*Myotis grisescens*), one Federally threatened plant, Missouri bladderpod (*Lesquerella filiformis* Rollins). In addition Federally threatened bald eagles (*Haliaeetus leucocephalus*) migrate through the park and often utilize the park as a winter roosting and feeding site. The Endangered Species Act requires that park managers ensure that park operations do not adversely affect listed, candidate, rare, and sensitive species, their habitats, or recovery efforts within the park. Any proposed management action that may adversely affect a Federally listed species at Wilson's Creek must be evaluated through the appropriate compliance procedures.

6. Antiquities Act of 1906, Archeological Resources Protection Act of 1979, Public Law 100-555, and Public Law 100-588

   These laws are designed to protect and preserve historic and prehistoric ruins, archeological sites, and other scientific resources located on land owned or controlled by the federal government. Superintendents are required to: develop plans for surveying lands under their control to determine the nature and extent of archeological resources on those lands; prepare a schedule for surveying lands that are likely to contain the most scientifically valuable archeological resources; establish a program to increase public awareness of the significance of Archeological resources located on public lands; and evaluate proposed management actions that may adversely affect archeological sites using appropriate compliance procedures. Wilson's Creek has approximately 50 archeological sites that are known to date.

7. National Environmental Policy Act of 1969: This act created a formal, legal process for integrating environmental values into federal decision-making, and provided an umbrella under which compliance with several environmental laws can be integrated. The act directs Superintendents to include in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment, a detailed statement on the environmental impact of the proposed action, any adverse environmental effects which cannot be avoided should the proposal be

implemented, and alternatives to the proposed action. The act also requires the federal natural aspects of our national heritage. Any action that significantly affects cultural or natural resources

D. OBJECTIVES OF GENERAL MANAGEMENT PLAN RELATED TO FIRE MANAGEMENT

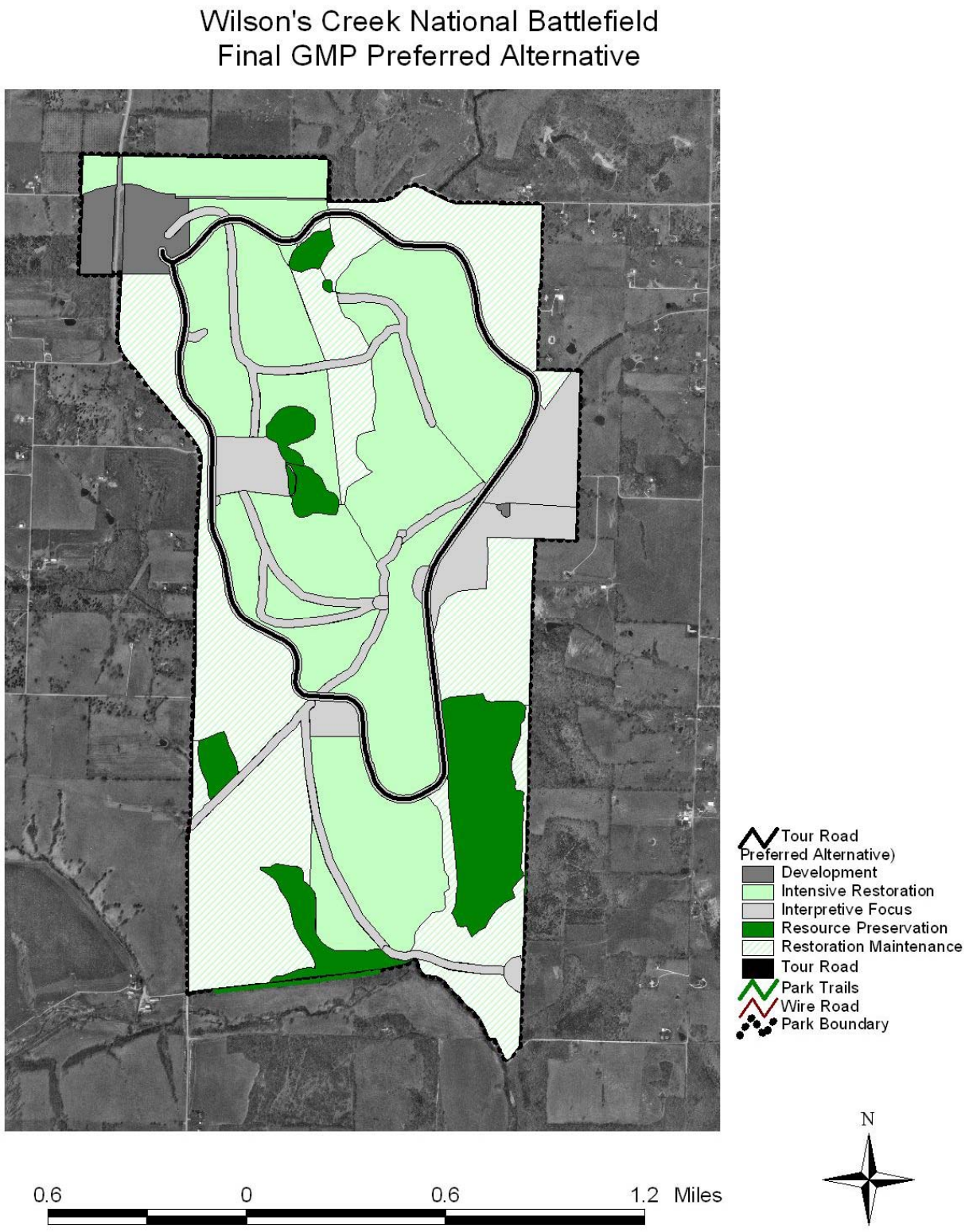
The 2003 General Management Plan (GMP) identified "continuing efforts to enhance the historic appearance of the battlefield landscape" as an issue requiring management action. Futhermore, "Land Rehabilitation" was a decision point of the plan which resulted in the creation of 3 management zones:

- Battlefield Landscape Enhancement
- Resources Preservation
- Landscape Maintenance Area.

Specific rehabilitation targets will be determined during the treatment phase of the Cultural Landscape Report. The GMP identified 1,418 acres that will require some level of vegetation management.

- Landscape maintenance zone, 546 acres. Emphasis will be on treating exotic species, mowing, and prescribed burning.
- Resource preservation zone, 154 acres. Emphasis will be on habitat management such as treating exotic species, prescribed burning, and stand thinning.
- Battlefield landscape enhancement, 718 acres. Emphasis will be on clearing (i.e. mowing, cutting, prescribed burning) weedy, woody, vegetative growth, maintenance of historic open fields, and the reestablishment of tall grass prairie, open timber communities, and other elements of the 19th century vegetation that characterized the park.

FIGURE 1


Wilson's Creek National Battlefield
Final GMP Preferred Alternative
Tour Road
Preferred Alternative)
Development
Intensive Restoration
Interpretive Focus
Resource Preservation
Restoration Maintenance
Tour Road
Park Trails
Wire Road
Park Boundary
N
0.6
0
0.6
1.2 Miles

E. OBJECTIVES OF RESOURCE MANAGEMENT PLAN (1999) RELATED TO FIRE MANAGEMENT

The Fire Management Plan is tiered to the Resource Management (RMP). The RMP provides general guidance for fire management activities. Objectives in teh RMP related to fire management are:

- Use fire to open up historic vistas in former battlefield areas;
- Rehabilitate and preserve oak savanna, prairie and glade habitats, and enhance native species;
- Protect and enhance Threatened and Endangered species habitat, specifically the Missouri bladderpod;
- Reduce encroachment of species such as eastern red cedar; lespedeza
- Reduce fuel loads through prescribed burns.
- Protect employees, public and park resources.
- Encourage the proliferation of native plants and historic densities of those plants.

F. ACHIEVING GENERAL MANAGEMENT PLAN AND RESOURCES MANAGEMENT PLAN OBJECTIVES THROUGH THE FIRE MANAGEMENT PLAN

Prescribed fire can be used to manage natural resources in support of the rehabilitation of and interpretation of the historic cultural landscape. Prescribed fire can also be used to benefit natural resources. With proper planning and execution, prescribed fire can be used to manage vegetation to produce healthier habitats and increase rare species populations. At the same time fuel management, using both mechanical means and prescribed fire, can reduce the risk to the historic structures and the NPS infrastructure on the unit as well as adjacent to park lands. Wildland fire suppression will also protect both natural and cultural resources from damage. Implementation of the FMP will achieve both GMP and RMP objectives listed under items D and E above.

A draft Cultural Landscape Report has been completed (2004). A brief summary of recommendations related to the FMP follow:

- Develop a prescribed fire plan that maximizes the size of prescribed fire units and attempts to burn annually or as frequently as fuel loads and/or park resources permit.[9]
- Employ BMPs for thinning and clearing woodlands. Undertake clearing and thinning operations with the goals of reducing fuel loads, opening viewsheds, and returning the woodland to its approximate composition during 1861.
- Mark all vegetation to be thinned or cleared prior to beginning work. Employ an arborist, natural resource manager, and/or landscape architect familiar with the park to mark the vegetation to be removed or thinned.
- Identify, control, and remove adventive plants.
- Establish a monitoring program to record populations of invasive and adventive plants within the park and utilize data collected to inform ongoing maintenance procedures.
- Maintain and enhance the health and diversity of vegetation in sensitive or remnant communities particularly the limestone glades and Manley woods shown on *figure 6-4*.

G. FMP Program Statement

The FMP is a detailed description of the actions necessary to carry out fire management policies and achieve both the GMP and the RMP objectives. Legal mandates related to the unit's establishment are also supported by the FMP.

III. SCOPE OF WILDLAND FIRE MANAGEMENT PROGRAM

A. BATTLEFIELD FIRE MANAGEMENT GOALS AND OBJECTIVES

- Provide for the safety of fire suppression staff, park employees, visitors, and park neighbors.
- Protect the visiting public from all wildland and prescribed fire activities while continuing to provide a quality visitor experience.
- Protect National Register properties (i.e 1750 acres), structures on the List of Classified Structures (i.e. 27), features of the cultural landscape, and park assets from unwanted fire.
- Protect threatened and endangered species (i.e. gray bats and Missouri bladderpod), by avoiding or mitigating significantly adverse impacts, from wildland fire, prescribed fire, and suppression activities.
- Use prescribed fire and fuel management projects to increase the distribution and abundance of Missouri bladderpod.
- Use prescribed fire and fuel management projects to manage natural resources in support of the rehabilitation of and interpretation of the historic cultural landscape.
- When using prescribed fire and fuel management projects use the best available scientific information and technology to support, monitor, and adaptively manage for the benefit of natural resources and the cultural landscape.
- Use prescribed fire and fuel management projects to maintain the ecological integrity of habitat and improve glade habitat in resource preservation zones.
- Use prescribed fire and fuel management projects to reduce exotic species distribution and abundance; and mitigate significant increases in exotic species due to wildland fire, prescribed fire, and suppression activities.
- Increase public awareness of the role of fire in natural processes and the use of fire in the restoration of natural habitat and rehabilitation of the cultural landscape through interpretive programs during the prescribed fire season.

B. Wildland Fire Management Elements

1. Wildland Fire

   a. Suppression – All wildland fire regardless of cause will be suppressed using a full suppression response. It is anticipated that local fire departments will continue to cooperate in this effort.

      Suppression operations are simplified by the number of roads and trails allowing good access to all portions of the unit. With the increase in residential construction close to the boundary, there is a corresponding increase in the potential of fires impacting urban areas.

   b. Wildland Fire Use – Due to the small size of the Battlefield and proximity of urban development there will be no Wildland Fire Use planned on the Battlefield.

2. Fuels Management

   a. Prescribed Fire – Emphasis will be placed on prescribed fires to rehabilitate and preserve the cultural landscape. Hazard fuel reduction will continue to be an important part of the prescribed fire program.

   Benefits of the prescribed fire program include:
   - restoration of the cultural landscape, and historic vegetation
   - control of exotic species
   - conservation of Threatened and Endangered Species
   - hazard fuel reduction

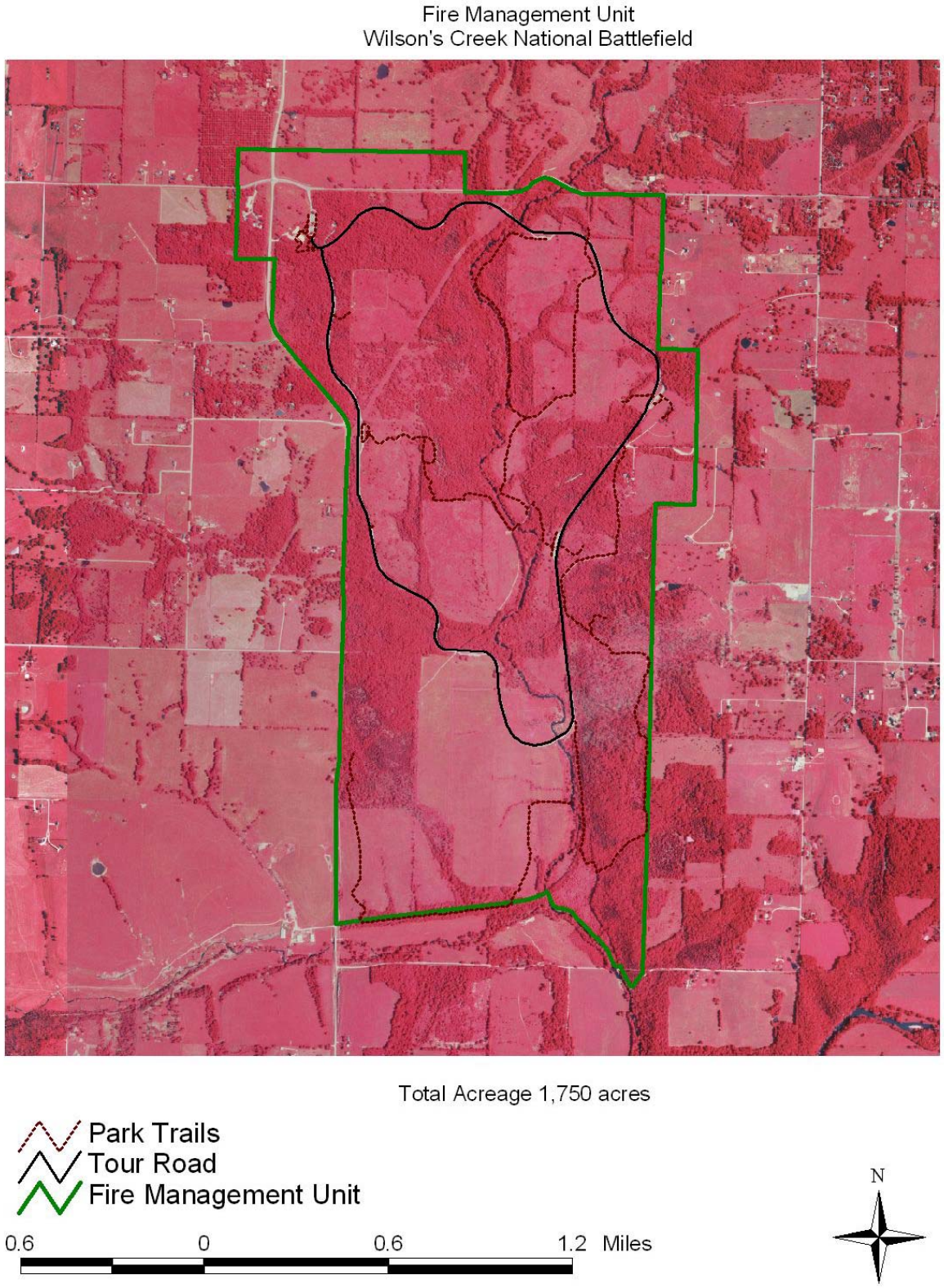
   The park is not funded to support fire positions. Fire ecology, monitoring and burning assistance will be provided by the staff at Ozark National Scenic Riverways. They will provide these services according to a Missouri parks fire management agreement (see appendix E).

   b. Non-fire Hazard Fuel Reduction – Non-fire treatments include mechanical thinning in forests, mowing of grasslands, and use of herbicide.Appendix I contains detailed information on planned fuel reduction projects. The Fire Prevention Plan (Appendix J) contains details on operational efforts towards fuel reduction such as grounds maintenance in developed areas (mowing, raking, etc.). A Wildland Urban Interface (WUI) project may be needed for portions of the park boundary (i.e. east) to protect neighboring properties.

C. DESCRIPTION OF FIRE MANAGEMENT UNIT (FMU)

Wilson's Creek National Battlefield contains only one FMU. The entire park is included in the FMU. Total Battlefield acreage is 1,750 with a burnable acreage of 1,712. Office/Visitor Center/Maintenance Facility and roads account for the difference in area.

FIGURE 2


Fire Management Unit
Wilson's Creek National Battlefield
Total Acreage 1,750 acres
Park Trails
Tour Road
Fire Management Unit
0.6
0
0.6
1.2 Miles
N

1. Characteristics of the Battlefield

   Wilson's Creek National Battlefield is located in southwest Missouri approximately 10 miles southwest of Springfield and 3 miles east of Republic, MO. The area is in the Ozark region of the state. Figure 3 shows the general location of the Battlefield in Missouri. Figure 4 shows the battlefield as it exists today.

FIGURE 3: Vicinity Map

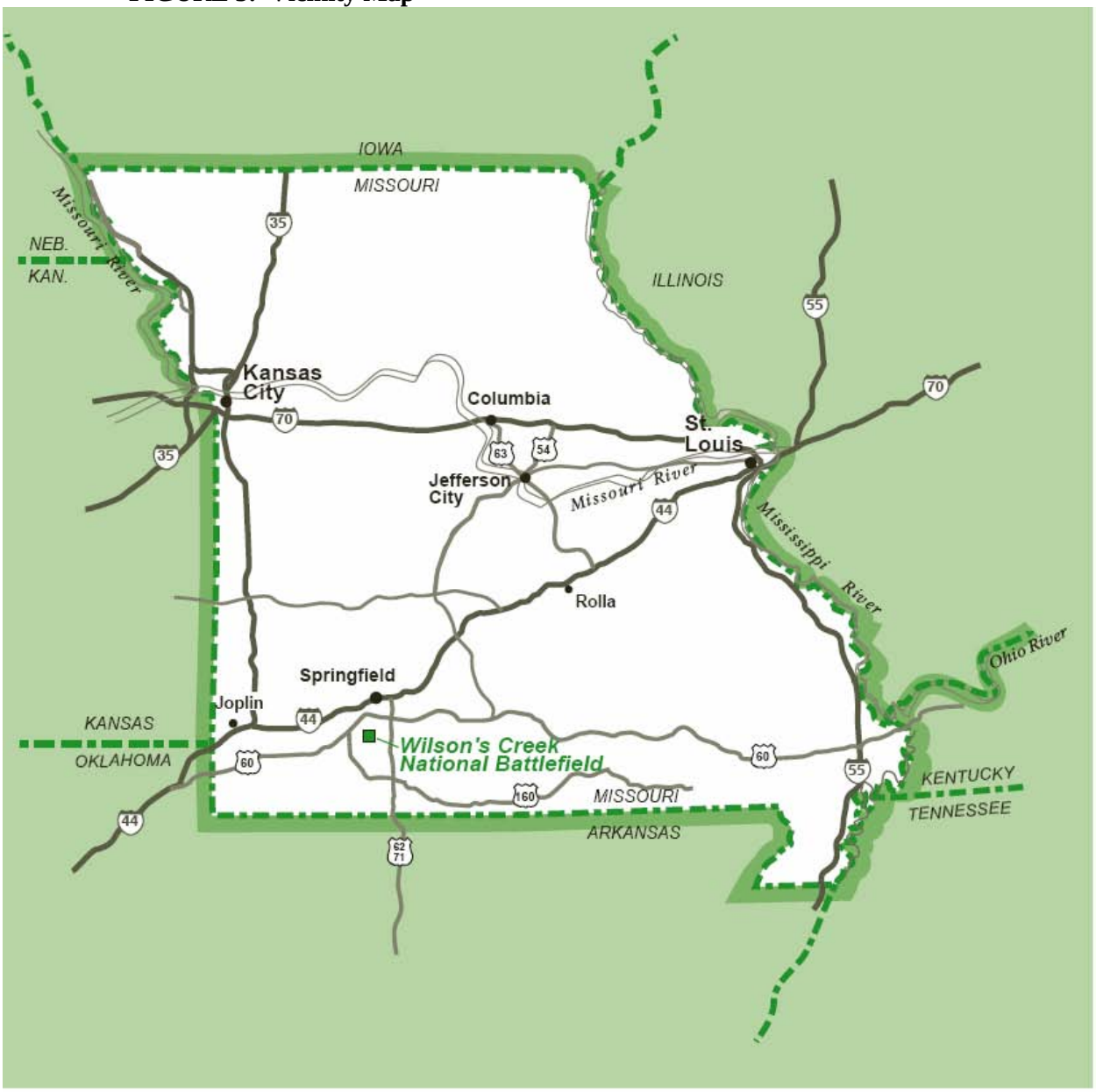
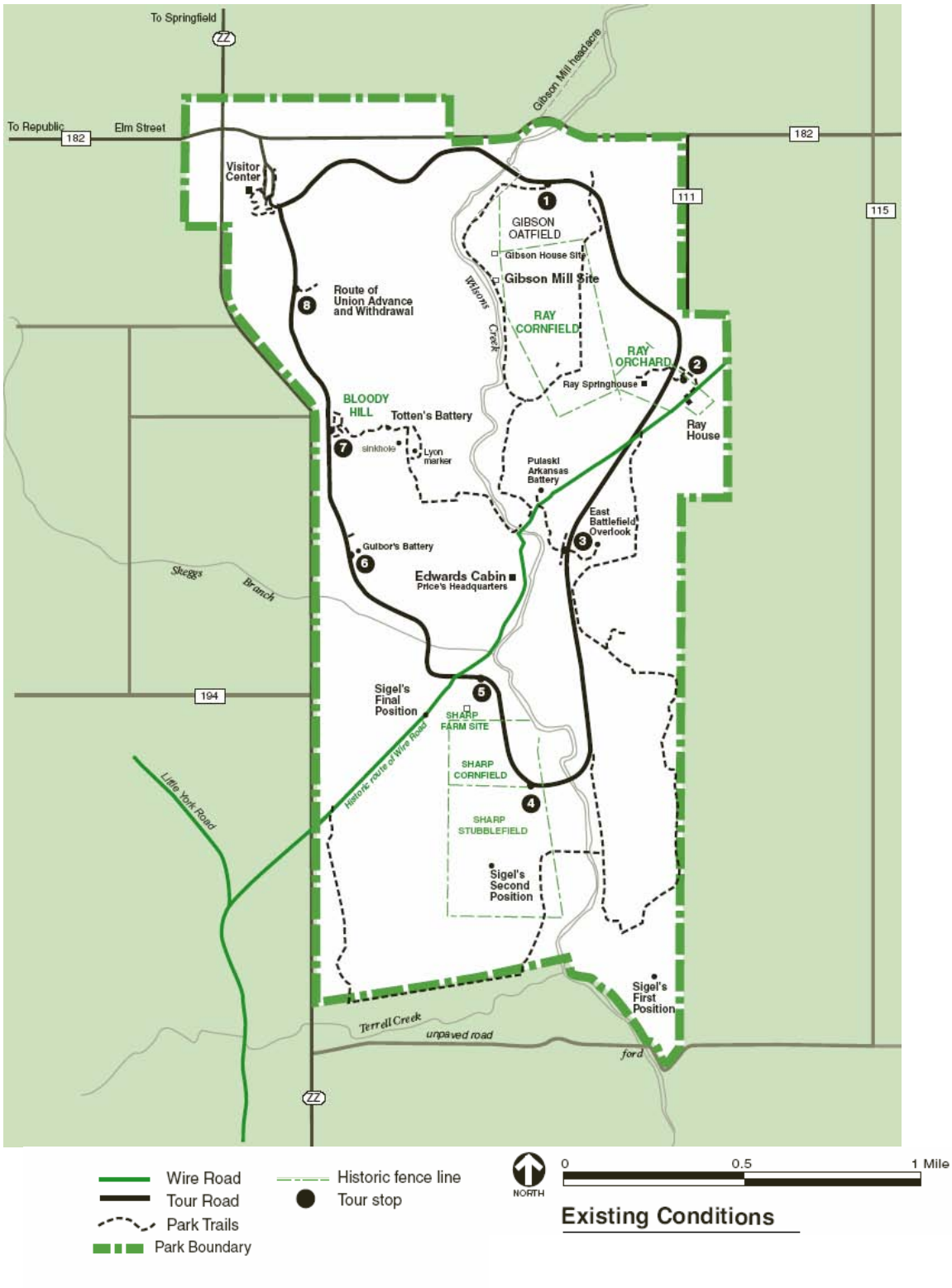


FIGURE 4 Wilson's Creek National Battlefield Existing Conditions



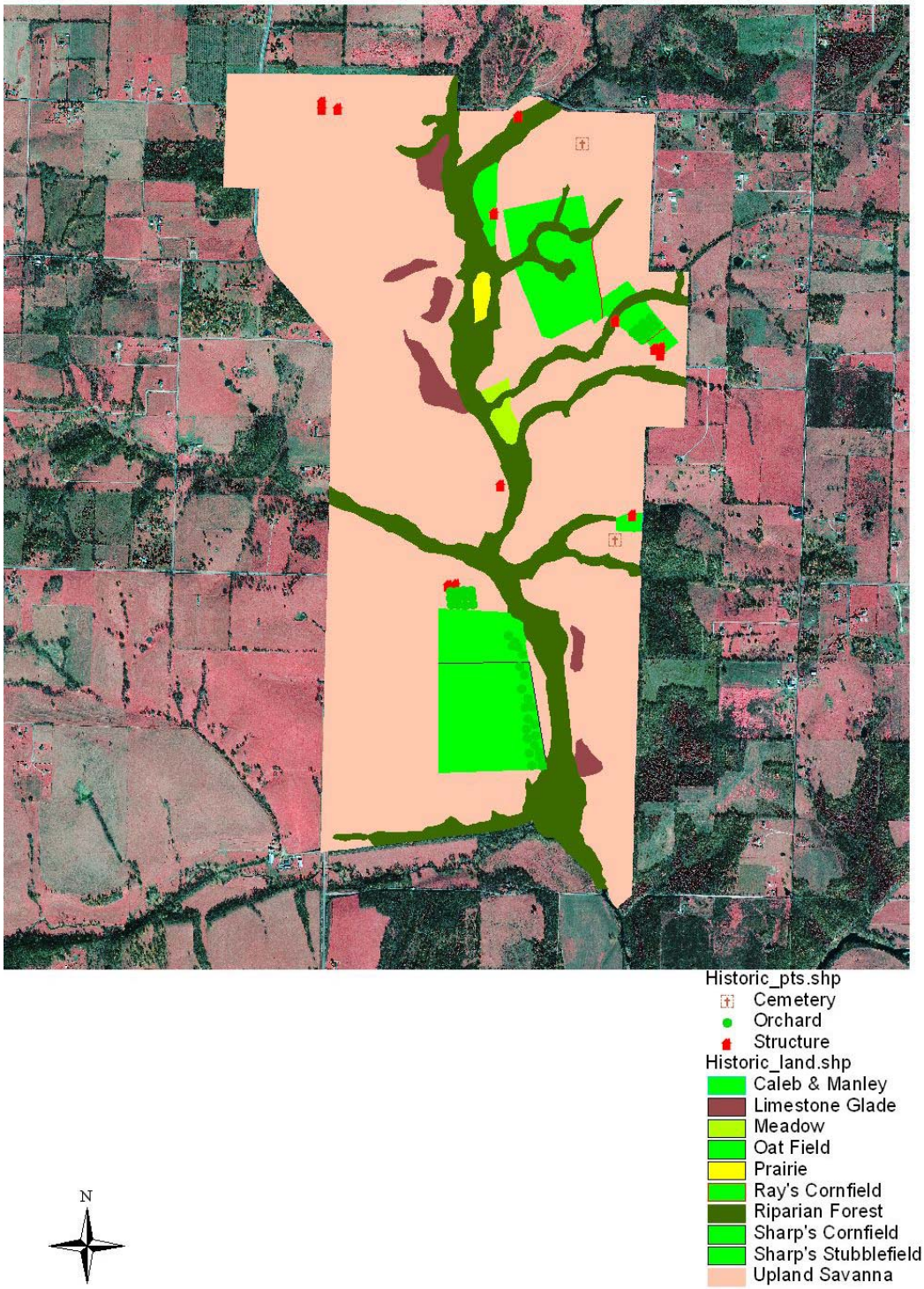
a. Vegetation – Ecologically, the park is located at the far-western edge of the eastern broadleaf forest province near the edge of the prairie parkland province (Bailey 1995). Historical documentation (figure 5) describes much of the park landscape as savanna (Missouri Department of Conservation 1986). Savanna is a fire-dependent environment that supports an understory of herbaceous, prairie species and an overstory of scattered trees. At the time of the battle, oaks were the dominant trees in the park area. In uncultivated areas, blackjack oak dominated the uplands, while other species of oaks were present in smaller numbers. Black oak, white oak, and post oak were dominant overstory species in the draws and bottoms.

FIGURE 5


Wilson's Creek National Battlefield
Pre-Settlement Vegetation, Gremaud (1986)
N
Presettlement_veg.shp
Limestone Glade
Prairie
Riparian Forest
Upland Savanna

FIGURE 6

Wilson's Creek National Battlefield
Desired Future Vegetation
Based on Gremaud (1986) and Bearrs (1978)



Although native plants were present in the area in 1861, much of the landscape had been converted to agricultural fields prior to the Civil War (figure 6). After the war, agricultural use of the land intensified with additional fields plowed and grazed. In addition, as agriculture expanded in the late 1800s and early 1900s, suppression of fires increased. The result of fire-suppression tactics, which decreased the frequency and extent of fire, was a gradual succession of uncultivated fields to thick, second-growth forests.

Vegetative communities at Wilson's Creek National Battlefield currently include a mosaic of mature forest, riparian woodland, prairie, and cultivated hay fields (figure 7). Each community type is present in various densities and successional stages indicative of changes in land-use patterns and/or fire suppression. For instance, some areas support high densities of red cedar that indicate succession from open fields or oak woodlands that have been affected by fire suppression activities. Some woodland areas were cleared prior to establishment of the battlefield and are populated by pasture or exotic grasses.

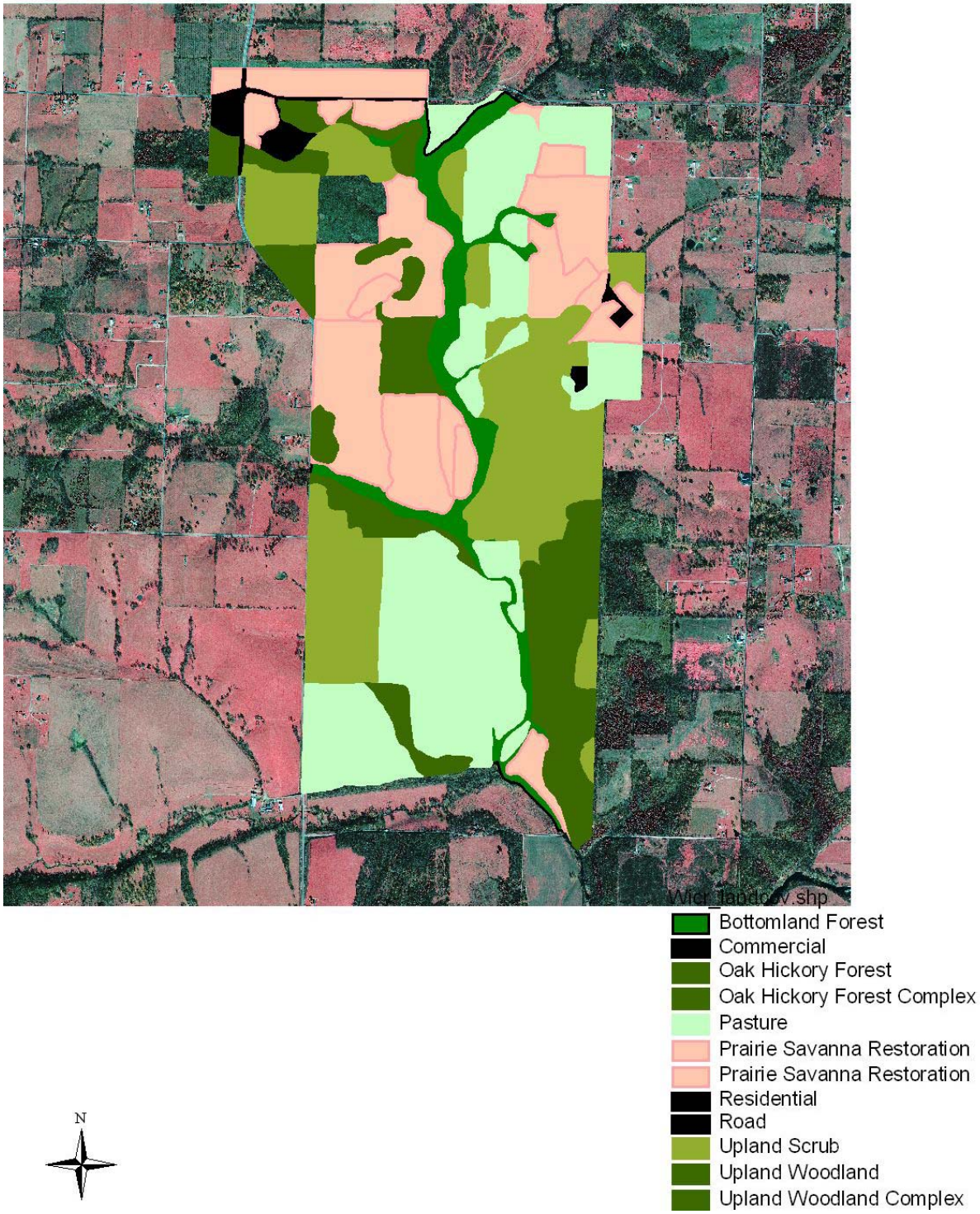
Interspersed among native plants are non-native, invasive species that continue to compete with native species for land and resources. Park staff have identified the most invasive exotic plant species in the park for which there are feasible control measures available. The species selected are based on the following factors: an un-published exotic species assessment done by Dr. Stubbendieck in 1992, weeds identified as noxious by the Department of Agriculture, exotics that are invading threatened species habitat, and exotics that are invading high quality native plant communities.

The following priority species have been identified: soft chess (*Bromus racemosus*), downy brome (*Bromus tectorum*), and barren brome (*Bromus sterilis*) can be controlled using proven control methods. These should include mechanical control combined with the application of management ignited prescribed fire during the growing season. Mulitflora rose (*Rosa multiflora*) can be controlled with a June application of glyphosate. Elemental abstracts identify this as a practical control method. Johnson grass (*Sorghum halepense*) can be controlled with a combination of mechanical and herbicide treatment. This plant can be mowed bi-weekly from March through June. At the end of July the plant can be treated with glyphosate. Musk thistle (*Carduus nutans*) is largely under control but the situation will be monitored to prevent re-invasion. Some plants are found each year, any plants found can be controlled using mechanical cutting. Chinese bushclover or sericea lespedeza (*Lespedeza cuneata)* can be controlled with a combination of mowing and herbicide application with triclopyr in June and early July. Park staff will continue to search for the most effective control methods which may include management ignited prescribed fire, mechanical, biological, and chemical methods. Honey locust (*Gleditsia triacanthos*) is the invasive tree of primary concern. Non-native plants currently inhabit dense patches on about 500 acres of parkland and pose a major management concern for park staff. Native species that are over abundant due to fire suppression and changes in land use are another concern. In places Osage orange (*Maclura pomifera*) and eastern red cedar (*Juniperus virginiana*) grow in such dense stands that all other species are excluded.

No sensitive biological communities are formally identified. Prairie Cluster Long Term Ecological Monitoring (LTEM) program staff monitor vegetation through the establishment of permanent plots in the prairies and woodlands of the Battlefield. Long term permanent plots have been established and data has been collected and analyzed for five years. This monitoring is being integrated with fire effects monitoring to avoid duplication of effort. The result is high quality scientific information that is used in the adaptive management process.

FIGURE 7

Wilson's Creek National Battlefield
Land Use Classes, 2003



b. Wildlife – Mammals found in the park included white-tailed deer, cottontail rabbits, squirrels, coyote, red and grey fox, raccoons, bobcats, skunks, opossums, woodchucks, muskrats, beavers, field mice, moles and gophers. In addition, a colony of federally endangered gray bats was discovered in the park in 1996.

Thirty-five species of song and insectivorous birds, common to the area, have been identified, as well as the red-tailed hawk, great blue heron and the killdeer plover. In addition, the common crow, vulture, bald eagle, and various ducks have been observed.

Wilson's Creek National Battlefield has a somewhat rich herpetofauna. A recent study (McCallum and Trauth, 2002) found nine amphibian species (four salamanders and five anurans) and 18 reptilian species (three turtles, six lizards, and nine snakes.

c. Threatened and Endangered Species – According to information received from the U.S. Fish and Wildlife Service and the Missouri Department of Conservation, two federally listed species and several species of special concern to the State of Missouri (state) have been documented at Wilson's Creek National Battlefield.

The Missouri bladderpod (*Lesquerella filiformis*) is listed as threatened by Federal government and endangered by the state government. Threats to Missouri bladderpod populations include woody encroachment of glade habitat by eastern red cedar, and invasion of exotic plants, including three species of annual brome grass (*Bromus racemosus* L., *B. sterilis* L. and *B. tectorum* L.). Recent management has focused on thinning cedar trees and controlling exotic brome grasses.

In addition, the state considers five additional plants at the park to be imperiled or critically imperiled, including greenthread (*Thelesperma filifolium* var. *filifolium)*, buffalograss (*Buchloe dactyloides*), blue gramma grass (*Bouteloua gracilis*), royal catchfly (*Silene regia*), and false gaura (*Stenosiphon linifolius*) (Missouri Department of Conservation 2000). Except for royal catchfly and false gaura, these plants are found on or adjacent to limestone glades. Royal catchfly inhabits transition zones in savanna habitat between open fields and woodlands. False gaura occurs along the tour-road loop near the southern bridge over Wilson's Creek and may have been brought into the park as part of a wildflower seed mix (Missouri Department of Conservation 2000).

In addition to plants, the Federal and state endangered gray bat (*Myotis grisescens*) has been observed in a cave within the park and a local researcher netted one individual during a study of red bats. Gray bats have a limited geographic range in the southeastern United States. They generally inhabit pits and caves in limestone karst regions characterized by sinks, ridges, and caverns (USFWS 1999). The gray bat was last documented in the park in 1996. The grotto salamander (*Typhlotriton spelaeus*), a species of concern to the state, was documented in this same cave during surveys conducted in 1985 (Missouri Department of Conservation 2000).

d. Geology – Rolling hills, hollows, and the valley of Wilson's Creek define the park's landscape, which has a lower elevation of 1,050 feet and a maximum elevation of approximately 1,250 feet.

The area contains karst features including numerous sinkholes in the vicinity of the park. A fault (Battlefield Fault) running roughly east-west crosses the extreme northeast corner of the battlefield. There are two known caves within the battlefield.

e. Soils – Primary soils at the park are deep, stony, and chert silt loam to shallow soils (9 to 20 inches in depth) over fractured limestone that have been formed by weathering of underlying parent materials, including limestone, dolomite, sandstone, and shale (NPS 1988). In addition, alluvial soils are present along Wilson's Creek and its tributaries. Limestone glades with shallow, rocky soils are scattered throughout the park and support vegetation different from other areas in the park, including several species of rare and protected plants.

Figure 8 on page 26 identifies prime farmland and soils within Wilson's Creek National Battlefield.

f. Hydrology – Wilson's Creek, with its watershed located predominantly outside of the park, is the primary aquatic feature at the battlefield. The creek flows south-southwest from the city of Springfield and bisects the park from north to south for about three miles before reaching its confluence with the James River about one mile south of the park. Skeggs Branch, a small tributary of Wilson's Creek, flows east and joins Wilson's Creek in the west-central portion of the park. McElhaney Branch also flows into Wilson's Creek and forms part of the park's southern boundary. Wilson's Creek National Battlefield also contains numerous springs and sinkholes.

Wilson's Creek is heavily influenced by the permitted discharge of wastewater from the city of Springfield (year 2000 population 151,580), which has a permit to discharge 42.5 million gallons of wastewater each day. During low-flow periods an estimated 80 percent of the water flowing through Wilson's Creek National Battlefield is wastewater.

g. Air Quality – The area is a Class II airshed. Missouri Department of Natural Resources Air Quality regulations have specific stipulations for the Springfield and Greene County area. Prescribed fire is considered agricultural burning within Greene County and burn permits are required.

h. Cultural Resources – There are various historical and archeological sites within the battlefield, either associated with early settlement or the battle itself. Some of the sites include the Ray House (an 1852 wood frame residential structure), the Ray springhouse, the McElhaney farm, two small family cemeteries, several house sites, and the identified sites of several historic fields. A total of 7 historic buildings (see table 1 on page 15) and over 50 archeological sites are present.

There are 7 historic buildings, 27 structures on the list of classified structures, and over 50 identified archeological sites scattered throughout the unit.

Table 1 - Historic Buildings

Historical Buildings	Number of Units
Edwards Cabin	1
McElhaney Farm	4
Ray House/ Springhouse	2
Total	7

Cultural Landscape – In support of the General Management Plan planning process, the National Park Service commissioned John Milner Associates, Inc. (JMA, formerly OCULUS) in 1999 to prepare this Cultural Landscape Report (CLR) (see page 9). The CLR, in concert with the objectives and approaches established in the GMP, will guide treatment and use of the historic landscape.

Wilson's Creek National Battlefield is listed on the National Register of Historic Places as a nationally significant historic battlefield landscape that retains a high degree of integrity. Because Wilson's Creek National Battlefield encompasses approximately 75 percent of the historic battlefield landscape, much of which is integral to the significance of the battle, restoration of the landscape to its 1861 appearance has for some time been considered an achievable and desirable goal by the NPS. The CLR, by documenting the historic landscape, comparing historic and existing landscape conditions, assessing the integrity and condition of the existing landscape, and evaluating its potential for further restoration of 1861 conditions, provides appropriate treatment recommendations and guidelines to support this goal. In addition, "because this is a historic place that included intact pre-settlement landscapes at the time of the battle, the CLR produces treatment recommendations that closely integrate the concerns, issues, and methodologies for natural and cultural resource management."

Since the 1970s, the park has focused on vegetation management as one of its primary tools to effect battlefield scene restoration. A primary focus of the CLR was therefore the evaluation of current vegetation management practices and the identification of additional strategies that will facilitate historic scene restoration. Another goal of the CLR was to synthesize and consolidate the information available in the numerous important studies and investigations that have been conducted into various aspects of the site's history over the past 35 years.

i. Unit Infrastructure – Real property on the battlefield includes the facility management complex, park headquarters building, water treatment complex and wayside exhibits .
NPS real property is valued at approximately $1,755,000 as shown in the table below.

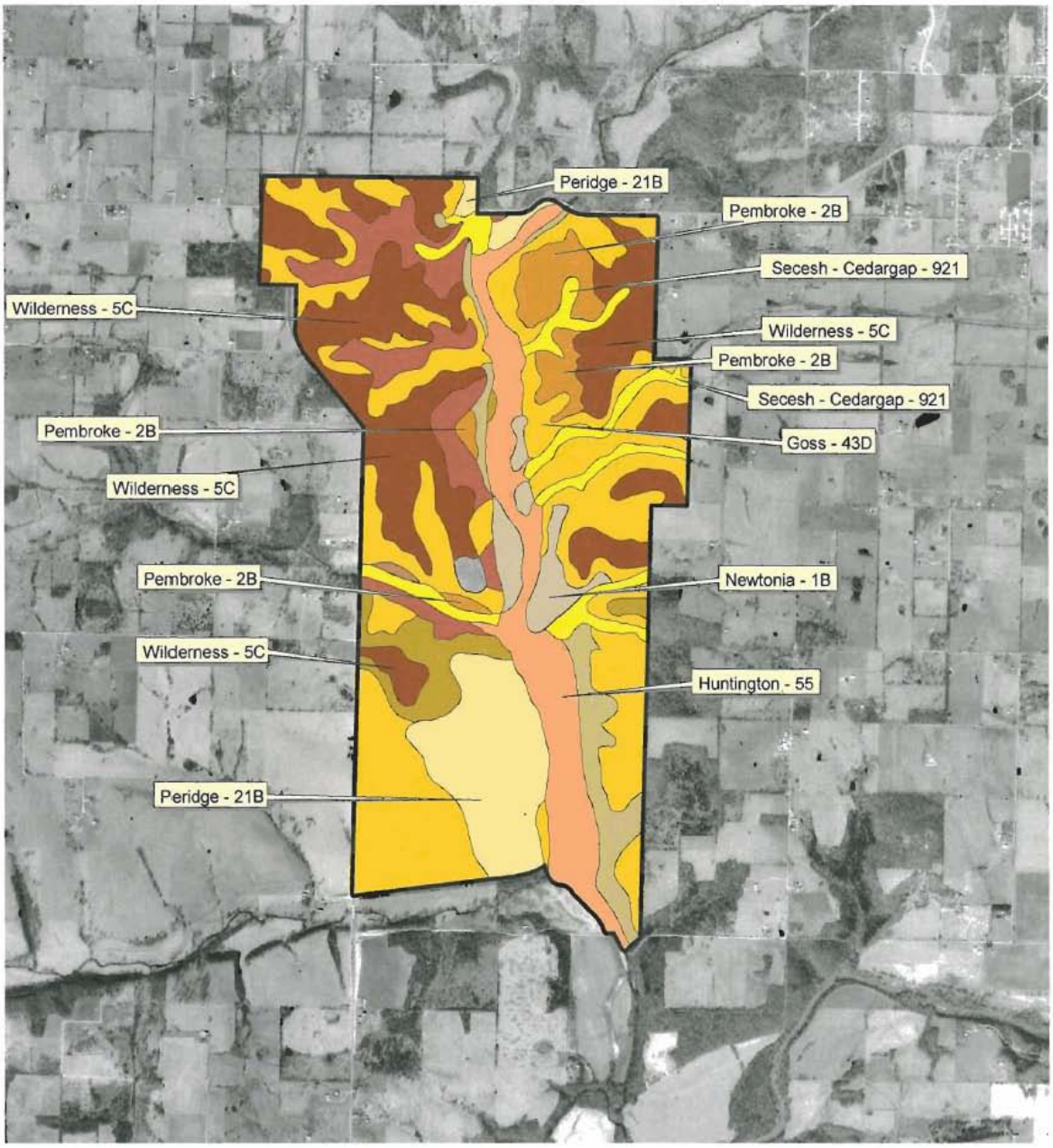
Table 2 - NPS Real Property Values

NPS Real Property Description	Number of Units	Value
Maintenance Complex	8	500,000
Park Headquarters	2	3,000,000
Water Treatment Complex	2	250,000
Tour Route Exhibits	14	5,000
Total	**25**	**3,755,000**

An addition to the visitor center/headquarters was completed in April of 2003. This increased the value of real property to over $3,000,000.

FIGURE 8

Wilson's Creek National Battlefield
Prime Farmland and Soils of Statewide Importance
1/23/03 Gary Sullivan



2. Fire Management Objectives

Measurable and strategic objectives for each Management Zone are based on the overall fire management goals for the Battlefield (see III.A.)

Landscape Enhancement Zone (720 acres)

Measurable Objectives:

- Provide for the safety of fire suppression staff, park employees, visitors and park neighbors.
- Contain 95% of all wildland fires to less than 10 acres.
- Conduct prescribed ignited fires with 98% contained within the prescribed unit and 98% of escapes to less than 50 acres.
- Plan the events with no accidents occurring during suppression, management ignited fires, and fuel management activities; one or less per year.
- Issue press releases and neighbor notifications one week before management ignited fires and fuel management projects. All press releases, notifications, media and visitor contacts should include information on safety and the projects role in glade management (i.e. threatened species management), and rehabilitating and preserving the cultural landscape of the battlefield.
- Reduce eastern red cedar canopy cover by 80% on one glade (south Wire Road glade) within 5 years.
- Reduce eastern red cedar canopy cover by 80% within 2 meters of historic trees identified in the historic trees map. (Release the stem and canopy of historic trees identified in the historic trees map.)
- Limit fire caused mortality to no more than a 3% historic trees identified in the historic trees map.

Specific objectives for re-established warm season grass habitat with woody plant invasion (see Appendix I) follow.

- Reduce the foliar cover of shrub species from 60% in 2003 to 30% by 2008.
- Maintain native species richness to within 10% of the level in 2003 (80)
- Increase the foliar cover of warm season grasses from 15% in 2003 to 20% by 2008.
- Reduce foliar cover of Sericea lespedeza from 18% in 2003 to 15% by 2008.

Resource Preservation Zone (150 acres)

Measurable Objectives:

- Provide for the safety of fire suppression staff, park employees, visitors, and park neighbors.
- Contain 95% of all wildland fires to less than 10 acres.
- Conduct prescribed fires with 98% contained within the prescribed unit and 98% of escapes to less than 50 acres.
- Plan the events with no accidents occurring during suppression, management ignited fires, and fuel management activities; one or less per year.
- Issue press releases and neighbor notifications one week before management ignited fires and fuel management projects. All press releases, notifications,

media and visitor contacts should include information on safety and the projects role in glade management (i.e. threatened species management), and rehabilitating and preserving the cultural landscape of the battlefield.
- Reduce eastern red cedar canopy cover by 80% within 2 meters of historic trees identified in the historic trees map. (Release the stem and canopy of historic trees identified in the historic trees map.)
- Limit fire mortality to no more than a 3% of historic trees identified in the historic trees map.

Specific objectives for glade habitats (see Appendix I) follow.
- Reduce woody shrub foliar cover from 38% in 2003 to 33% in 2008.
- Reduce canopy cover of woody trees from 75% in 2003 to 65% in 2008.
- Maintain native species richness to within 10% of the level in 2003 (120)
- By 2008 reduce foliar cover of annual bromes by 10%.
- By 2008 reduce foliar cover of Sericea lespedeza by 75%.
- By 2008 maintain oak recruitment within 10% of the 2003 level.
- Maintain populations of Missouri Bladderpod on 5 glades.

Specific objectives for Manley woodland (see Appendix I) follow.
- Increase native species richness from 105 species in 2003 to 115 species in 2008.
- Reduce the seedling recruitment of Eastern Red Cedar from 150 seedlings/400 square meters in 2003 to 50 seedlings in 2008.
- Increase oak (red and white oaks) recruitment from 100 seedlings/400 square meters in 2003 to 125 seedlings in 2008.

Specific objectives for limestone benches will require additional fire monitoring.
- Reduce the canopy cover of eastern red cedar over 1 meter in height 40%.

Specific objectives for woodland habitats will require additional fire monitoring.
- Reduce canopy coverage of trees by mechanical methods 5%.
- Maintain oak (red and white oaks) seedling recruitment.

Landscape Maintenance Zone (540 acres) and Development Zone

Measurable Objectives:

- Provide for the safety of fire suppression staff, park employees, visitors, and park neighbors.
- Contain 95% of all wildfires to less than 10 acres.
- Conduct management ignited fires with 98% contained within the prescribed unit and 98% of escapes to less than 50 acres.
- Plan the events with no accidents occurring during suppression, management ignited fires, and fuel management activities; one or less per year.
- Issue press releases and neighbor notifications one week before management ignited fires and fuel management projects. All press releases, notifications, media and visitor contacts should include information on safety and the projects role in glade management (i.e. threatened species management), and rehabilitating and preserving the cultural landscape of the battlefield.

- Reduce eastern red cedar canopy cover by 80% within 2 meters of historic trees identified in the historic trees map. (Release the stem and canopy of historic trees identified in the historic trees map.)
- Prescribe burns cause no more than a 3% loss of historic trees identified in the historic trees map.
- Specific objectives for limestone benches will require additional fire monitoring.
- Reduce the canopy cover of eastern red cedar over 1 meter in height 40%.
- Specific objectives for woodland habitats will require additional fire monitoring.
- Reduce canopy coverage of trees by mechanical methods 5%.
- Maintain oak (red and white oaks) seedling recruitment.

3. Management Considerations

   a. Firefighter caution is required in the area of a 69kv overhead transmission line on wood poles . (potential safety issue). This line will likely be increased to 161kv by 2006.

   b. Firefighter should avoid contact with water in Wilson Creek as there is a history of waste water contamination.

   c. Protection of historic structures is secondary to firefighter and public safety.

   d. Class II air quality should be maintained.

   e. Bulldozers and other tracked vehicles will not be utilized without approval of the superintendent.

   f. Adverse effects on sensitive species should be avoided.

   g. Provide for safety of visiting public, particularly those on trails away from normal access routes.

   h. Wooden structures including 10 wooden bridges on park trails and reconstructed rail fences should be protected.

4. Historic Role of Fire

   Reference Condition:

   Henry Rowe Schoolcraft (1821) traveled along the James River several miles downstream from present day Wilson's Creek National Battlefield. On Monday, Jan. 4th, 1819 he described the following landscape:

   "The prairies, which commence at the distance of a mile west of this river, are the most extensive, rich, and beautiful, of any which I have ever seen west of the Mississippi river. They are covered by a coarse wild grass, which attains so great a height that it completely hides a man on horseback in riding through it. The deer and elk abound in this quarter, and the buffaloe is occasionally seen in droves upon the prairies, and in the open high-land woods. Along the margin of the river, and to a width of from one to two

miles each way, is found a vigorous growth of forest-trees, some of which attain an almost incredible size. The lands consist of a rich black alluvial soil, apparently deep, and calculated for corn, flax, and hemp. The river-banks are skirted with cane, to the exclusion of all other underbrush; and the lands rise gently from the river for a mile, terminating in high-lands, without bluffs, with a handsome growth of hickory and oak, and a soil which is probably adapted for wheat, rye, oats, and potatoes. Little prairies of a mile or two in extent are sometimes seen in the midst of a heavy forest, resembling some old cultivated field, which has been suffered to run into grass."

Private Eugene Ware of the 1st Iowa Infantry Regiment described the following landscape after the Battle of Wilson's Creek in 1861:

"The hills bore some scattering of oaks and an occasional bush, but we could see clearly, because the fire had kept the undergrowth eaten out . . . the few trees were rather large, scrawling, and straggling, and everything could be distinctly seen under them all around."

Two important but mostly qualitative evaluations of the 1861 vegetative condition of the Battlefield were completed early in the parks management history. In 1978 NPS Historian Ed Bearss completed a study using official army records, soldier and citizen accounts, early land survey records, and other historic information sources to produce a historic base map and ground cover map for the park (Figure 5 and 6). Using Bearss study Greg Gremaud (1986), used explorer's notes, early land survey records, soldier's accounts, ecological influences, and current quantitative evaluations to draft a plan for the restoration of the historic vegetation at Wilson's Creek.

According to Germaud the pre-settlement vegetation of Wilson's Creek was a savanna of scattered oaks and a prairie plant herbaceous layer. The savanna of the uplands was dominated by blackjack oak. Structurally this savanna varied in density with the bulk of it supporting less than 10 trees per acre. Within this sparsely treed matrix there were scattered groves of trees occasionally reaching over 40 trees per acre. This correlates well with Simon (2002) who indicated that the average woodland tree density throughout the Ozarks was 18-30 trees per acre but is now 300 – 1000 trees per acre. Gremaud went on to describe that mesic slopes likely supported a more dense and varied flora, but could still be classified as savanna. Rock outcrops, more specifically limestone glades, supported a xeric herbaceous flora and scattered, stunted trees. The bottomlands of the battlefield were often as sparsely timbered as the uplands; however, differed in species composition. The dominant species were black, post, and white oaks; lesser species were sycamore, elm, hackberry and walnut. Germaud recommended a prescribed fire return interval between 4 and 5 years and believed the pre-settlement fire return interval was between 5 and 10 years.

Based on Bearss (1978) study we know that in 1861 approximately 20 to 40 percent of the pre-settlement vegetation was modified by the presence of: 5 and 7 farms, their associated buildings, orchards, fields, fences, and roads; one mill; two cemeteries; and a telegraph line. Most accounts indicate that the remainder of the battlefield's vegetation was similar to pre-settlement conditions. The notable exception was an increase in brush due to the absence of Native American caused ignitions, and an increase in grazing due to European settlement.

With fire suppression the emphasis of federal agencies until recent years, many areas of the park that were savanna have become overgrown with shrubs, trees, and brush. Former vistas are obstructed, making it difficult in some instances for visitors to visualize and understand tactics, troop movements, and the historic appearance of battlefields and surrounding areas. While a complete return to a natural fire regime is impossible due to the small size of the park and proximity to nearby towns and urban areas, fire is an important tool in helping to restore historic vistas. Providing a more historically accurate view of the vegetation that would have been found at the time of the battle is extremely important.

At Wilson's Creek, management of natural resources and the cultural landscape are tied together. Over a period of time fire suppression in the park has decreased habitat diversity; some species formerly identified on the site have vanished. Returning to a landscape that more closely approximates the historic vegetation will enhance native diversity and may aid in restoring some species no longer found in the park. Judicious use of fire may also aid in the recovery of Threatened and Endangered species.

Table 3: Current Conditions and Fire Regimes for Wilson's Creek

Potential Natural Vegetation Group	Description	Fire Frequency (MFI) Current	Fire Frequency (MFI) Reference	Fire Severity (% overstory removed) Current	Fire Severity (% overstory removed) Reference	Fire Regime Group Reference	Condition Class
	Across the Entire Landscape	3-4	3-5	60	50-90	I	II
K083	Cedar Glades	3-4	3-5	20	80-90	I	II
K100	Oak-Hickory Forest	3-4	3-5	65	50-90	I	II

Potential Natural Vegetation Descriptions -K100 Oak-Hickory Forest:
The Kuchler (2004) Oak-Hickory Forest type description is 27 pages long and although focused on closed canopy systems includes the dominate vegetation type at Wilson's Creek, savanna. The description identifies savanna as "transitional vegetation occurring at the interface between oak (Quercus spp.)-hickory (Carya spp.) forest and tallgrass prairie". This description further defines oak savanna as "open-grown oaks with 10 to 80 percent crown cover, with or without a shrub layer, and with a ground cover of grasses and forbs. The understory vegetation of savanna is a mixture of both prairie and forest species, with prairie forbs and grasses more abundant in areas of high light, and forest forbs and woody species more abundant in areas of low light" . . . . "The herb layer in oak savannas consists mostly of bluestem prairie species, namely big bluestem (Andropogon gerardii), little bluestem (Schizachyrium scoparium), Indian grass (Sorghastrum nutans), switchgrass (Panicum virgatum), and many prairie forbs".

Nuzzo identified two types of savanna that likely occurred at Wilson's Creek in 1861 "open savanna and scrub savanna." Descriptions taken from land survey notes indicate

that both types of savanna likely occurred at Wilson's Creek. "Scrub savannas are generally located on the dry to dry-mesic areas of steeper topography, particularly hillsides, dunes, and ridges". "Open savanna is a parklike community with widely spaced trees, virtually no shrub layer, and an herbaceous ground layer." "Scrub savanna is made up of moderate to dense thickets of oak sprouts within a prairie matrix, with a few fairly dwarfed open-grown trees. Open savannas usually occur on flatter, usually mesic areas." Soldier descriptions and a drawing of the vegetation on the southern slope of Bloody Hill in 1861 indicate that this was likely a scrub savanna.

Savanna vegetation tends "to clump together on ridges and upper slopes. In grassy openeings and on steep slopes and other dry exposures oak-hickory associates co-occur with plant species such as eastern red cedar (*Juniperus virginiana*) that are tolerant of xeric conditions. On the Ozark Plateau dry ridges and south-facing slopes are usually occupied by open communities of post oak and blackjack oak".

Ordination studies in western Oklahoma "demonstrated that the vegetation pattern corresponded to a complex moisture gradient. Post oak and blackjack oak co-dominated forests occuping the xeric end of the gradient, post oak dominated stands located in the middle (slightly more mesic), and forests at the mesic end of the gradient included sugar maple, elm, and Shumard oak-dominated stands. Post oak and black hickory appear to require relatively high levels of nutrients and moisture, while blackjack oak is tolerant of drier, less fertile sites". Witness trees documented in land survey notes indicate the lands near Wilson's Creek were dominated by blackjack oak and post oak.

"The structure of most savannas is highly dependent on fire frequency; savannas are converted to more closed forest in less than 50 years without fire". . . . "The persistence of some high-quality savannas may be related to the droughty soils on which they occur. Some savannas, in particular those located on thin soil or rocky substrates, have survived moderate grazing, exclusion of fire, and competition with alien and woody species. Light grazing may have helped maintain the savanna. Some stands have survived because they have been burned relatively frequently".

"Fire is an important factor in establishing and maintaining vegetation patterns in the Ozark Mountains. . . .Repeated fires create open, parklike stands of oak (due to the fact that) most oaks are resistant to fire to some extent; fire resistance generally increases with stem diameter. Most oaks sprout from dormant basal buds after top-kill. Sprouting species are favored over other hardwoods by occasional fires".

Fire History: Fire in the Ozarks is "as essential an ecological process as rainfall." Regular ground fires are the predominant ecological process that created and maintained the open woodland and savanna structure (Simon 2002). Historically humans used fire to improve travel, for hunting wild game, to promote nut and berry production, to prepare sites for agriculture, and to improve browsing and grazing conditions (Guyette 2004).

Traditionally fire histories are based on 1) qualitative information such as explorer notes, land survey notes, early settler diaries, and historic maps. Bearss (1978) and Gremaud (1986) used these resources to compile their studies; 2) some sort of quantitative data that documents the fire history. This information is usually gathered from fire scars, pollen cores, or rodent middens. The Karst geology of the Ozarks usually rules out pollen cores,

and rodent middens are primarily used in the Southwestern United States. Fire histories in the Ozarks are typically based on fire scar data.

Based on fire scar data Guyette (1982) predicted a fire frequency of 3.2 years (1730 to 1870) on an Ozark glade in southwestern Missouri (near Ava, MO); after 1870 it dropped to 22 years. Fire frequency has been positively correlated with human population densities (Guyette 2004), but after 1830 the Osage Tribe was displaced and the migrations of the Shawnee, Delaware, and Cherokee Tribes through the Ozarks were complete fire frequency declined dramatically (Dey 2004). Guyette (1991) also predicted a fire frequency of 4.3 years (1710 to 1810) on a post oak savanna near Ava. After 1810 the fire free interval climbed to 6.4 years. Guyette states that "An increase in oak stems of sapling size may have resulted from the low fire frequency between 1810 and 1850." If a similar drop in fire frequency was followed by an increase in oak saplings at Wilson's Creek this research would help corroborate eye witness accounts of the battle and a sketch of "Bloody Hill" that documents an abundance of oak saplings up to 20-25 feet tall with some larger savanna trees present. In the Ozarks topographic roughness is positively correlated with the length of mean fire intervals (Guyette, 2004). Wilson's Creek is less steep and further west than the two sites near Ava, therefore, the frequency was likely shorter. Dey (2004) compared the mean fire return intervals for four sites in the Missouri Ozarks. Before 1830 the fire frequency is positively related to human population density, after 1830 population density is inversely correlated with fire frequency due to cultural changes land use effects (i.e. cultivation and grazing) that reduce the frequency and severity of fires. All four of these sites are 25 miles or more east of Wilson's Creek National Battlefield, therefore, the mean frequency may have been lower at Wilson's Creek.

The following table is from Dey (2004).

Table 2—A comparison of mean fire return intervals at White Ranch State Forest, Caney Mountain Wildlife Refuge, Laclede County, and Cedar Glades

Period	WRSF	CMWR	LACCO	CEDAR
			years	
1710–1830	3.7	4.8	3.0	3.3
1831–1980	7.6	6.9	12.5	9.4

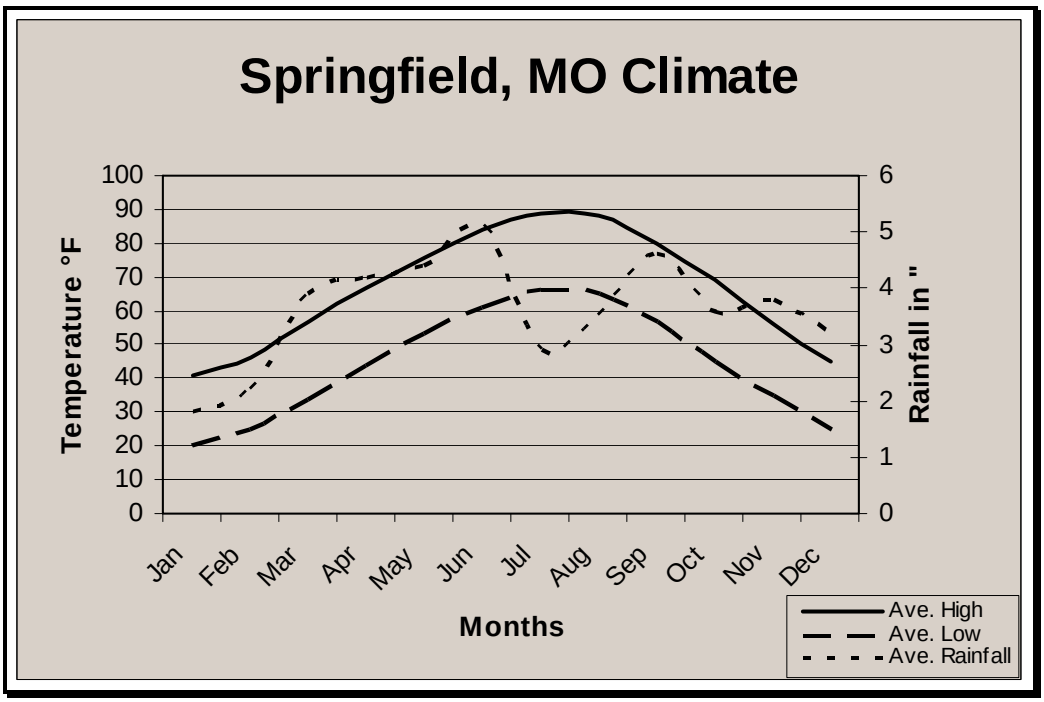
WRSF = White Ranch State Forest; CMWR = Caney Mountain Wildlife Refuge; LACCO = Laclede County; CEDAR = Cedar Glades.
All sites are more than 50 km from the White Ranch State Forest.

January 6, 2004, Rich Guyette was consulted by Chief of Resources Management, Gary Sullivan, during a Fire Management Workshop. Based on his experience and extensive dendrochronology database he felt that the mean fire interval for Wilson's Creek between 1700 and 1800 was 3-5 years. However, Dey (2004) points out that information based on fire scar data from oaks should be used with caution. Post oaks are very resistant to fire scarring by low intensity fires. This may result in an under estimate of the number of fires in post oaks growing under low intensity surface fire regimes. In short, mean fire intervals determined from fire scars on oak trees should be viewed as minimum fire return intervals.

5. Wildland Fire Management Situation

a. Historical Weather Analysis – The climate is typical of the south-central U.S. Prevailing winds are from the south and southwest. Summers are warm and humid and winters mild to moderate. The growing season averages about 199 days and rainfall occurs about 106 days each year. Average annual rainfall at Springfield is 43.2".

FIGURE 9 - Springfield Climatology



Temperature and rainfall recorded at Springfield, MO is shown on the chart above. Average high temperatures range from 41°F in January to 89°F in July. Average lows range from 20°F in January to 66°F in July. Record temperatures range from -17°F in February, 1979 to 113°F in July, 1954. January is the driest month on average while June is the wettest. During the hottest part of the summer (July and August) the rainfall drops off. Due to the high humidity and growth cycle of grass and brush, live fuel moistures are generally high and summer wildland fire danger is not generally too high, however, late summer (i.e. August) can be very dry with high fire danger.

Prevailing winds are usually less than 10 mph in speed. The park is in Tornado Alley and tornado touchdowns have been experienced in the park. In May of 2003 a tornado damaged over 138 acres of woodlands in the park.

b. Fire Season – Generally the fire season for southwest Missouri extends from fall to early spring. The fall fire season normally lasts from early September until late November and is characterized by cool nights and warm days. Fall can be quite dry. Killing frosts occur in October with hard freezes common in November. Freezing and subsequent dehydration of perennials and grasses combined with the dropping of deciduous foliage creates an abundance of light flashy fuels causing fire dangers to become quite high.

The spring transition stage from cured to green foliage occurs more rapidly than the fall curing. Summer decomposition reduces surface litter to an annual minimum by the end of September.

There is not enough wildland fire history to establish a FirePro wildland fire season. The historic record indicates a split season with most activity taking place from October 1 to November 15 and in the spring, from March 1 to April 15. Prescribed fire activity usually takes place from mid-March to mid April although a number of late summer burns have been successfully accomplished.

c. Fuel Characteristics – Vegetation types of major concern to fire management are the oak savanna, old fields, and grass-cedar glades. For predicting fire danger potential, these cover types are represented by NFDRS Fuel Models E (hardwoods winter), N (sawgrass), and T (sagebrush w/grass). The following table shows the acreage of fuels.

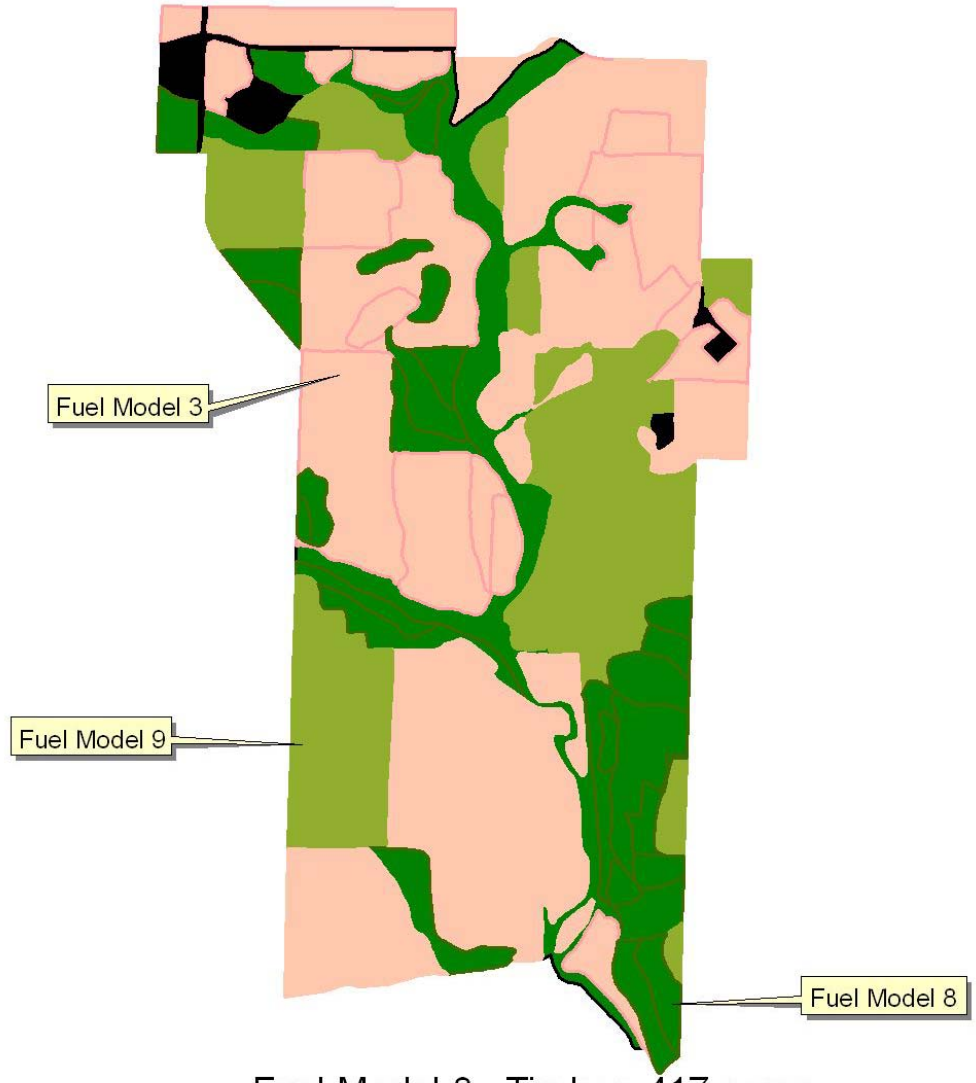
Table 4 - Area of Fuel Models

NFDRS Fuel Model	Acres
C-Open Pine w/Grass	81
E-Hardwood Litter (fall)	503
L-Western Perennial	37
N-Sawgrass	878
T-Sagebrush w/Grass	213
Total	**1,712**

Critical fire behavior variables, such as flame length, rate of spread, and fireline intensity are estimated using the BEHAVE computer software and Northern Forest Fire Laboratory (NFFL) fuel models 3, 8, and 9 as these are the predominant fuels and offers the greatest resistance to control.

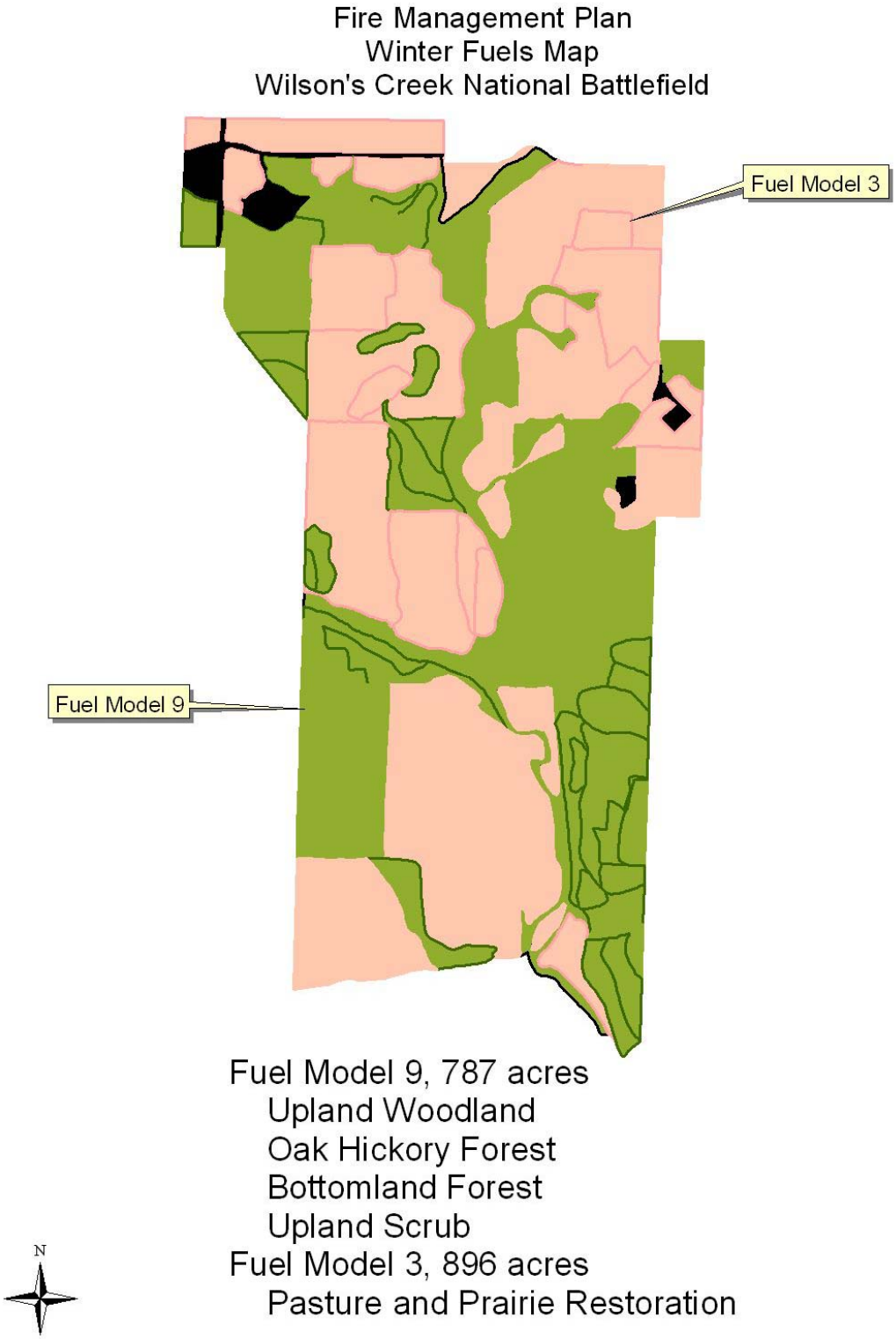
FIGURE 10

Fire Management Plan
Spring/Summer Fuels Map
Wilson's Creek National Battlefield



Fuel Model 8, Timber, 417 acres
Upland Woodland
Oak Hickory Forest
Bottomland Forest
Fuel Model 3, Grassland, 896 acres
Pasture and Prairie Restoration
Fuel Model 9, 370 acres
Upland Scrub

FIGURE 11


Fire Management Plan
Winter Fuels Map
Wilson's Creek National Battlefield
Fuel Model 3
Fuel Model 9
Fuel Model 9, 787 acres
Upland Woodland
Oak Hickory Forest
Bottomland Forest
Upland Scrub
Fuel Model 3, 896 acres
Pasture and Prairie Restoration
N

d. Fire Regime Alteration – The fire regime of the Battlefield area has been altered several times since pre-settlement by Europeans. Tree ring data support a fire frequency of 3-5 years between the years of 1700 to 1800, however, the actual frequency was probably 1-3 years, some evidence even points to annual fall burning. Fire frequency between 1800 and 1860 was less frequent, perhaps 7 – 10 years. Fire frequency between 1860 and 1944 was still less frequent, perhaps over 20 years. Fire frequency between 1944 and 1988 was probably 44 years due to the effectiveness of fire suppression efforts after World War II. Fire frequency during the length of the prescribed burn program at Wilson's Creek (1988 – 2004) ranges from 2 to 58 years and averages approximately 5 years.

e. Control Issues – The Battlefield has a good network of roads and trails allowing access to most areas of the unit quickly. Most areas of grass cover are surrounded by hardwood forest and fire behavior will normally be reduced as the transition from grass fuels to hardwood forest occurs. Rapid rates of spread of fire in grassland fuels can present a control problem. Approximately ½ of the boundary of the unit consists of paved roads. There are no in holdings; however, the rapid urbanization near the boundary is likely to increase wildland fire threat to both on and off unit values.

   At this time two local fire departments have agreements with the Battlefield (Brookline and Clever) for suppression the agreement is found in Appendix E.

f. Values to Protect – Park historic structures, historic trees, and cultural landscapes are among the primary values to be protected. With the exception of the Edwards Cabin, the historic buildings are located adjacent to roads on the east side of the unit. NPS infrastructure is located along the north boundary and is again adjacent to roads with limited risk from wildland fire.

   Cultural and archeological sites are generally at or below ground surface and subject to more damage from suppression actions than fire itself. Buenger (2004) found that prescribed fires in grassland fuels has a limited impact on surface archaeological materials. Thermal alteration of artifacts analyzed from the Homestead and Pipestone National Monument collections, which were subjected to prescribed burning in grassland fuels, was not significant.

   Missouri bladderpod is the a Federally listed species that could be negatively impacted by wildfires. Wildland fires in glade habitats from late October through June may adversely affect the plant. In order to mitigate potential impacts of fuel treatment projects park staff will:
   1) Suppress all wildland fires.
   2) Conduct prescribed fires, mechanical and chemical fuel treatment between the dates of July 1 and October 15th.
   3) Continue to monitor the species.

   Smoke from fires could impact gray bats hibernating in caves. In order to mitigate potential impacts park staff will:
   1) Suppress all wildland fires.
   2) Continue to restrict access to caves within Wilson's Creek National Battlefield.

3) Check caves yearly for the presence of Gray bats. Report yearly findings to the U.S. Fish and Wildlife Service and the Missouri Department of Conservation.
4) Designate a 300 foot buffer zone around the cave that harbored Gray bats in 1996. No vegetative disturbance will be allowed including prescribed fires within this zone.
5) Wilson's Creek Resource Management staff will check caves for the presence of Gray bats before conducting prescribed burns. If bats are confirmed present prescribed burning activities will be conducted between 9:00 am and 4:00 pm under conditions of a mixing height of at 2,000 feet to permit maximum smoke dispersal.
6) Maintain a continuous corridor of trees at least one canopy wide (based on the canopy of a typical mature, bottomland, hardwood species) on both sides of Wilson Creek.

In rare (cold winter) cases bald eagles roost in several trees along Wilson Creek while feeding. Park staff will not cut standing trees along Wilson Creek unless they present an immediate safety hazard.

FIGURE 12 Cultural Landscape Report Existing Conditions

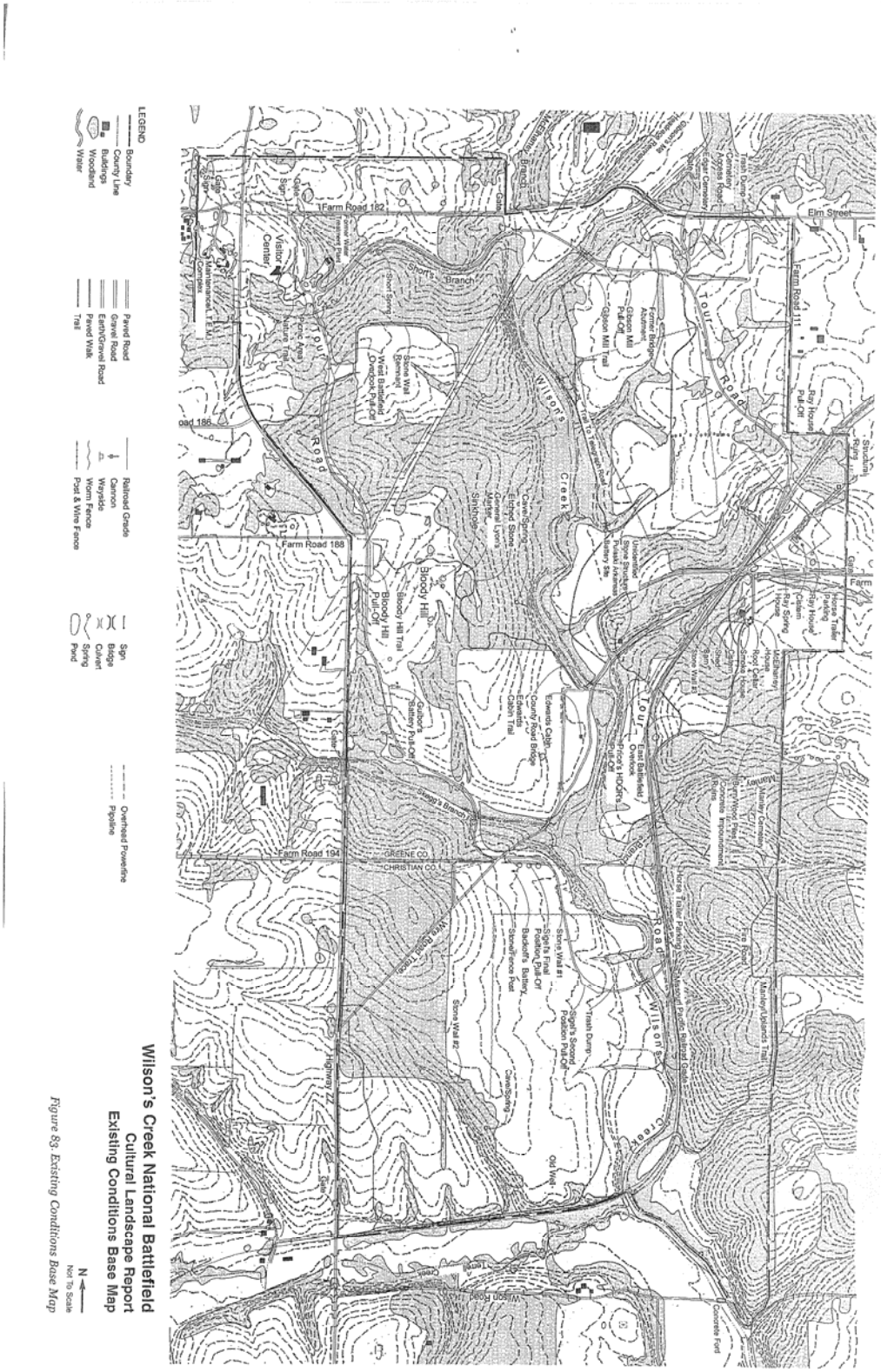
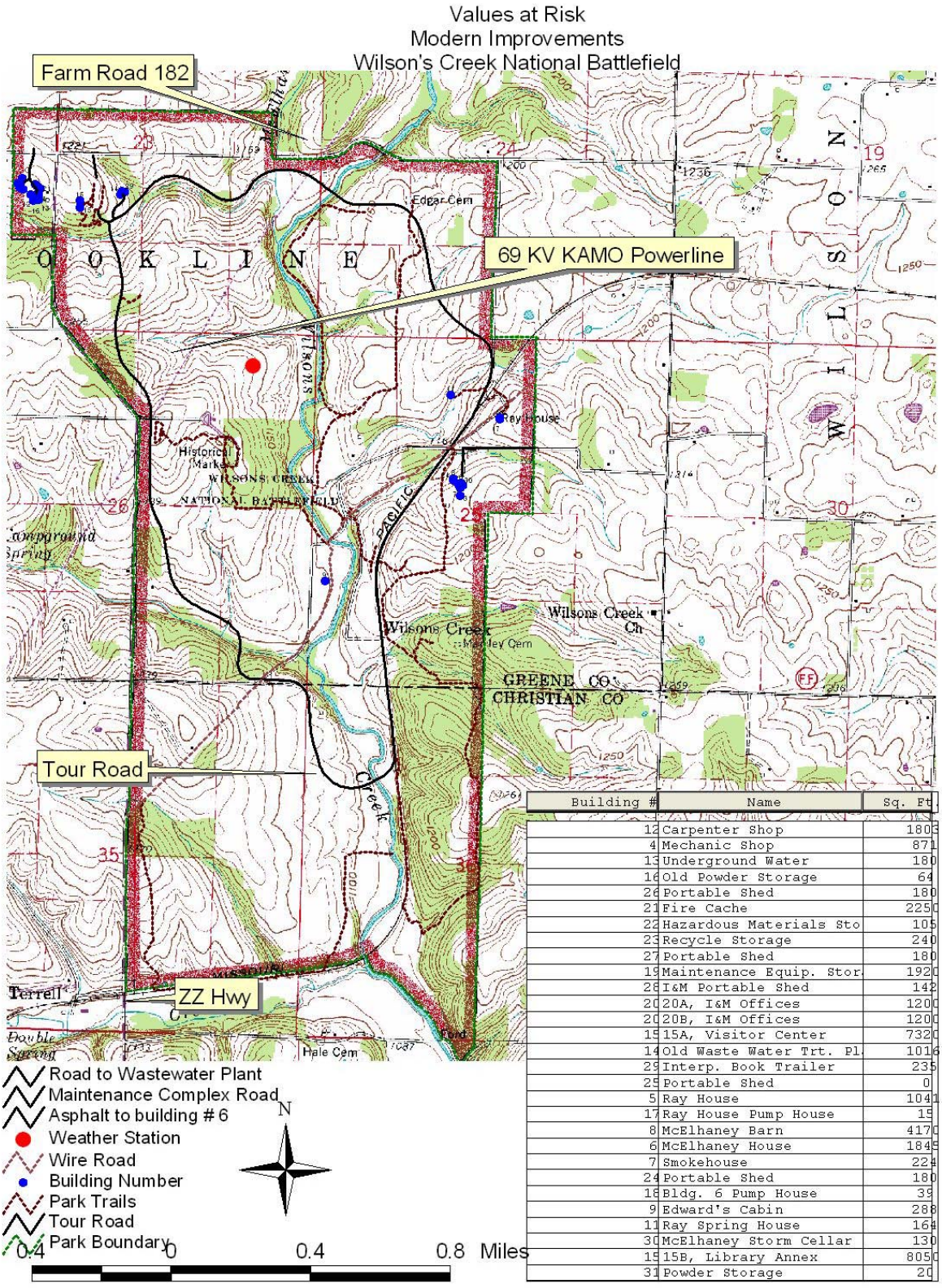


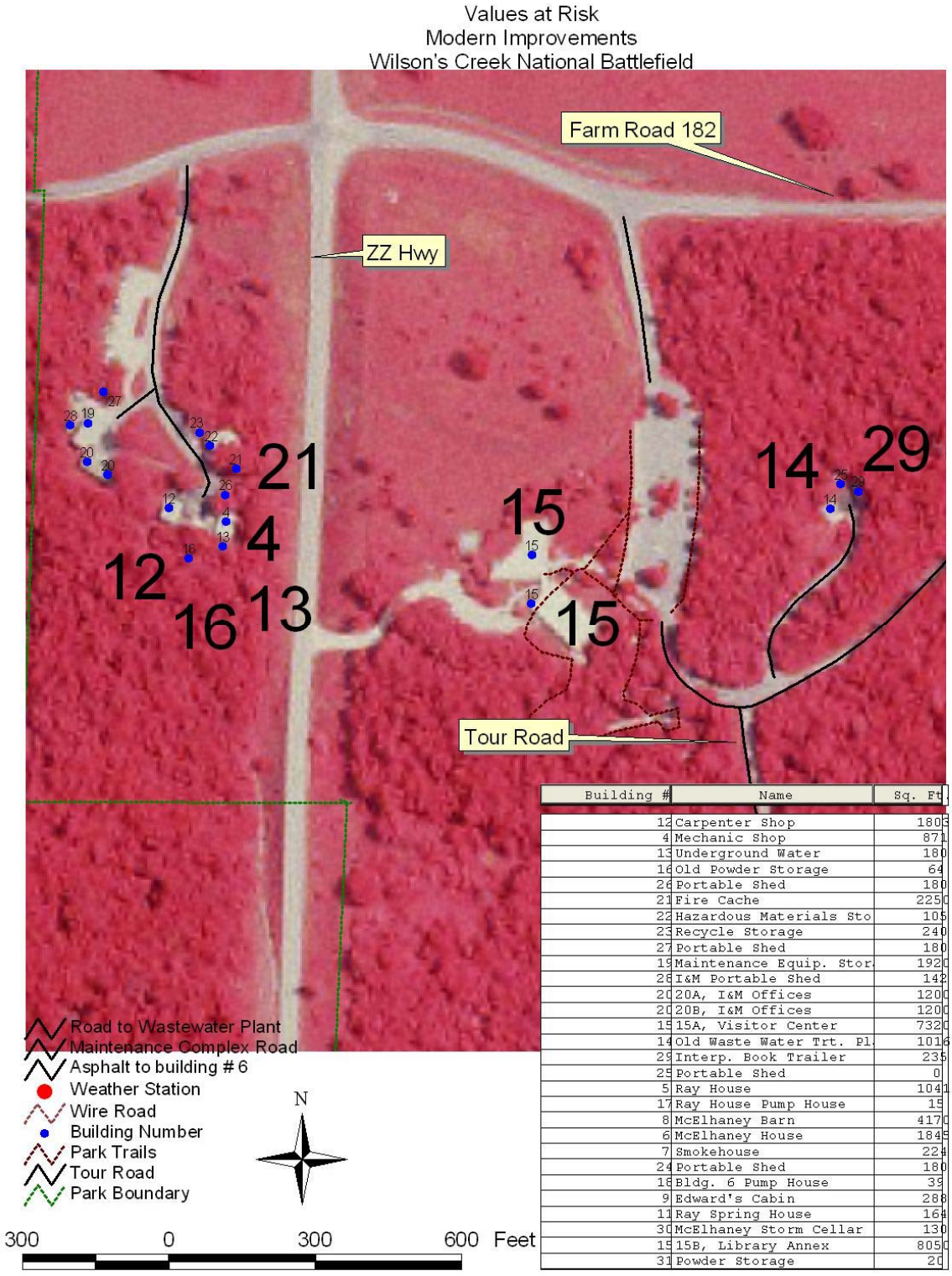
Figure 83. Existing Conditions Base Map

FIGURE 13



Building #	Name	Sq. Ft
12	Carpenter Shop	1803
4	Mechanic Shop	871
13	Underground Water	180
16	Old Powder Storage	64
26	Portable Shed	180
21	Fire Cache	2250
22	Hazardous Materials Sto	105
23	Recycle Storage	240
27	Portable Shed	180
19	Maintenance Equip. Stor	1920
28	I&M Portable Shed	142
20	20A, I&M Offices	1200
20	20B, I&M Offices	1200
15	15A, Visitor Center	7320
14	Old Waste Water Trt. Pl	1016
29	Interp. Book Trailer	235
25	Portable Shed	0
5	Ray House	1041
17	Ray House Pump House	15
8	McElhaney Barn	4170
6	McElhaney House	1845
7	Smokehouse	224
24	Portable Shed	180
18	Bldg. 6 Pump House	39
9	Edward's Cabin	288
11	Ray Spring House	164
30	McElhaney Storm Cellar	130
15	15B, Library Annex	8050
31	Powder Storage	20

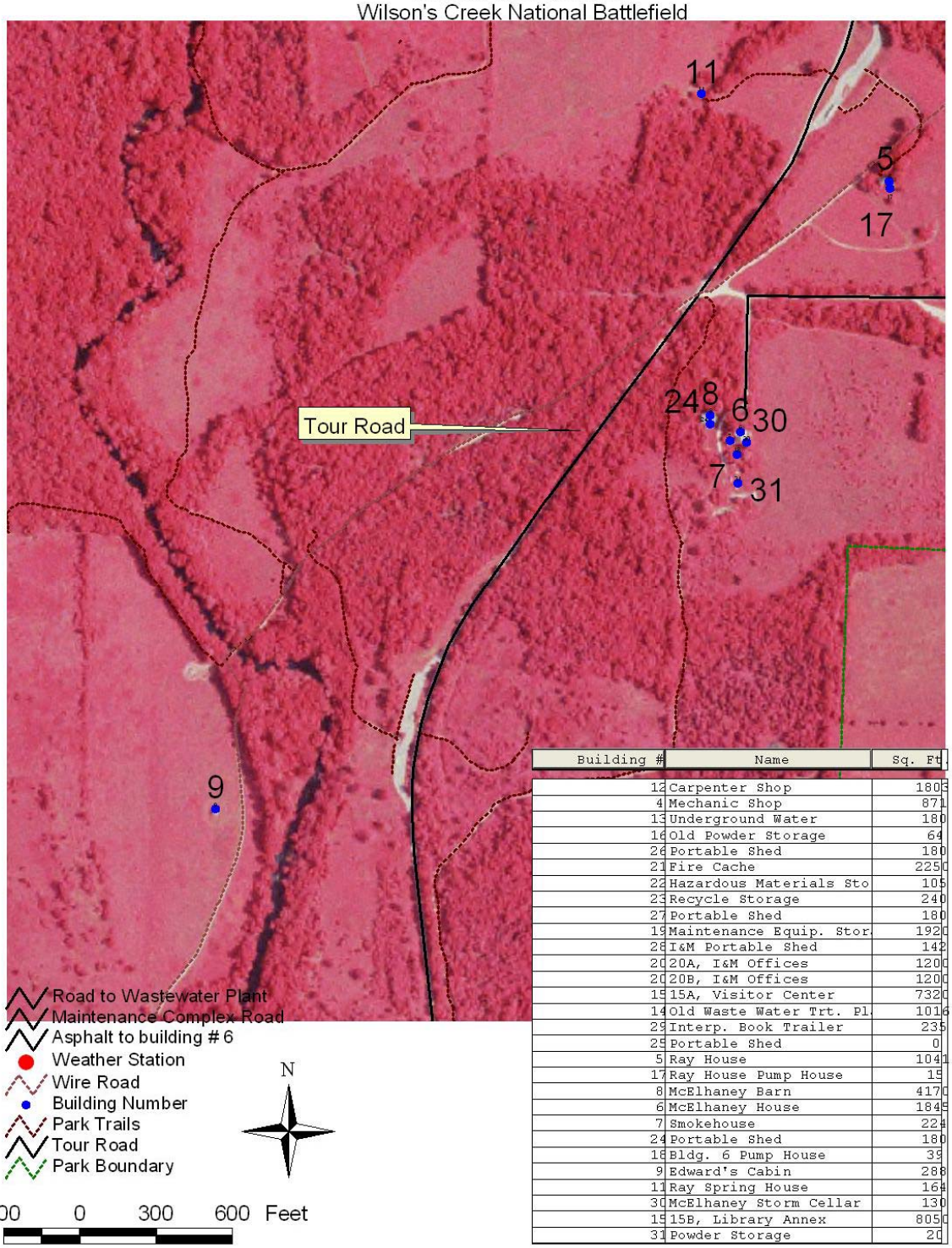
FIGURE 14



Building #	Name	Sq. Ft.
12	Carpenter Shop	1803
4	Mechanic Shop	871
13	Underground Water	180
16	Old Powder Storage	64
26	Portable Shed	180
21	Fire Cache	2250
22	Hazardous Materials Sto	105
23	Recycle Storage	240
27	Portable Shed	180
19	Maintenance Equip. Stor	1920
28	I&M Portable Shed	142
20	20A, I&M Offices	1200
20	20B, I&M Offices	1200
15	15A, Visitor Center	7320
14	Old Waste Water Trt. Pl	1016
29	Interp. Book Trailer	235
25	Portable Shed	0
5	Ray House	1041
17	Ray House Pump House	15
8	McElhaney Barn	4170
6	McElhaney House	1845
7	Smokehouse	224
24	Portable Shed	180
18	Bldg. 6 Pump House	39
9	Edward's Cabin	288
11	Ray Spring House	164
30	McElhaney Storm Cellar	130
15	15B, Library Annex	8050
31	Powder Storage	20

FIGURE 15

Values at Risk
Modern Improvements
Wilson's Creek National Battlefield



Building #	Name	Sq. Ft.
12	Carpenter Shop	1803
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15	15A, Visitor Center	7320
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9	Edward's Cabin	288
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30	McElhaney Storm Cellar	130
15	15B, Library Annex	8050
31	Powder Storage	20

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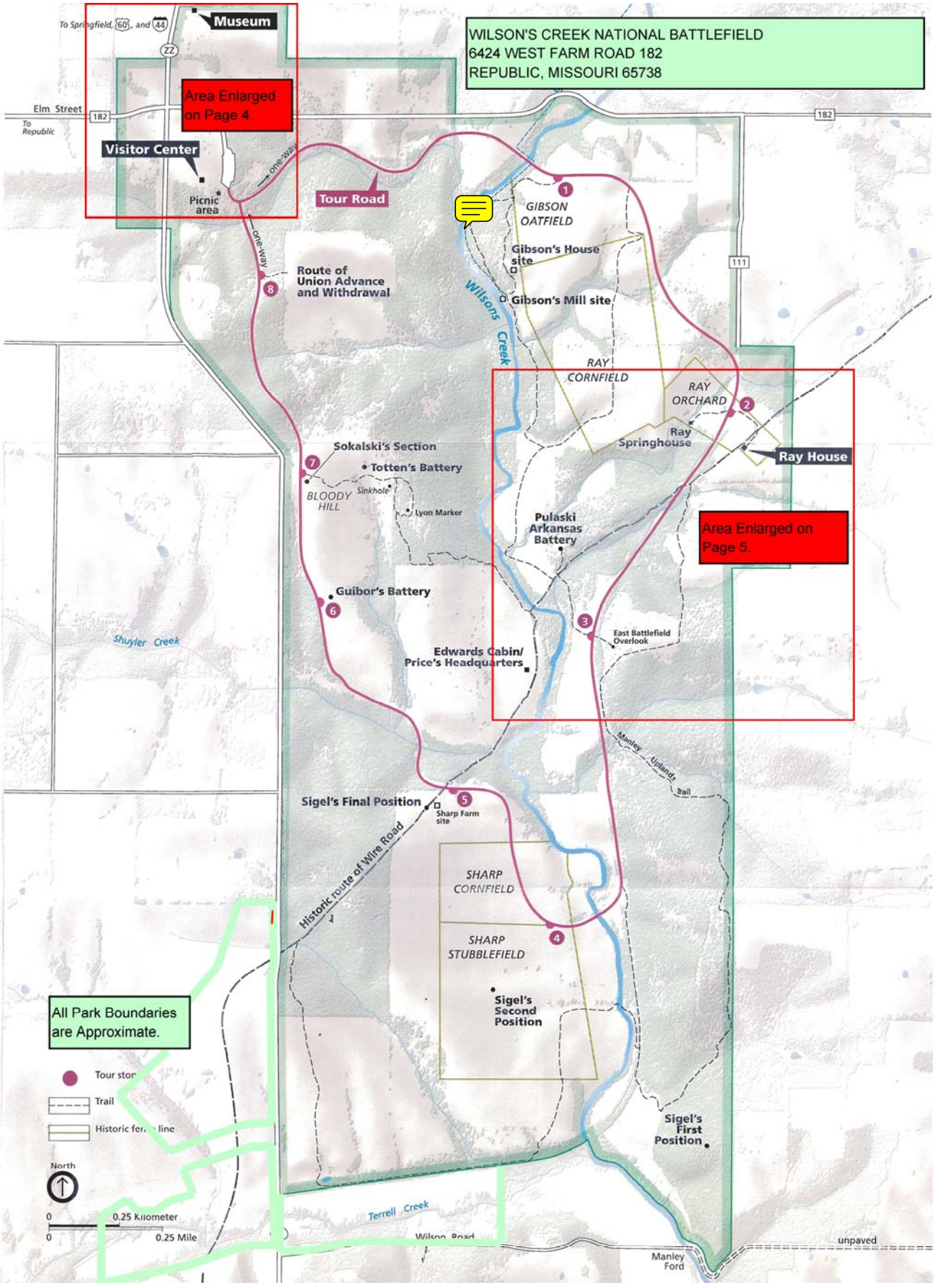
11:36 am, 3/30/07



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Values at Risk, Modern Improvements
Wilson's Creek National Battlefield

Bldg.	Name	Sq. Ft.
4	Mechanic Shop	871
5	Ray House	1041
6	McElhaney House	1845
7	Smokehouse	224
8	McElhaney Barn	4170
9	Edward's Cabin	288
11	Ray Spring House	164
12	Carpenter Shop	1803
13	Underground Water	180
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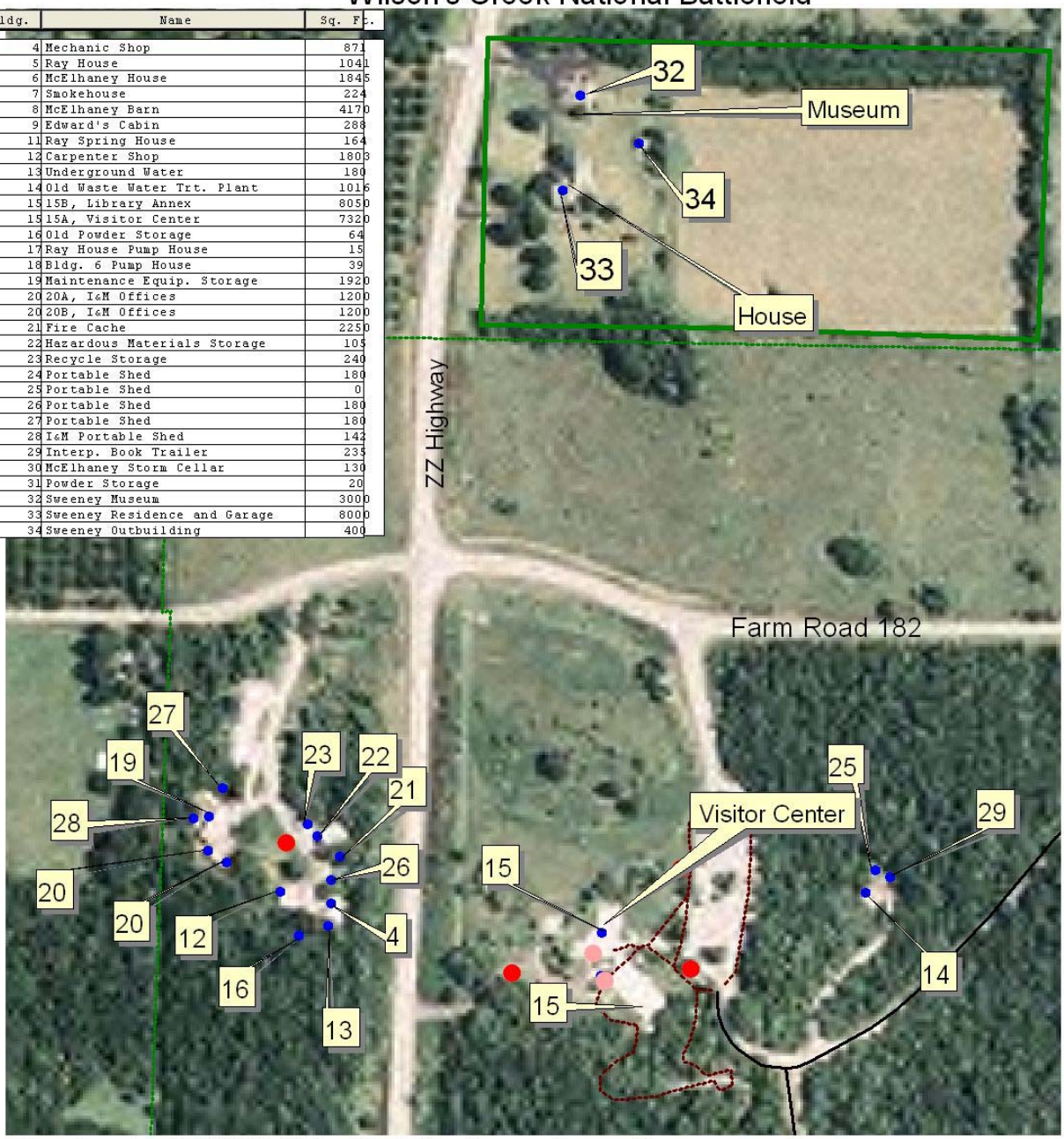
20	20B, I&M Offices	1200
21	Fire Cache	2250
22	Hazardous Materials Storage	105
23	Recycle Storage	240
24	Portable Shed	180
25	Portable Shed	0
26	Portable Shed	180
27	Portable Shed	180
28	I&M Portable Shed	142
29	Interp. Book Trailer	235
30	McElhaney Storm Cellar	130
31	Powder Storage	20
32	Sweeney Museum	3000
33	Sweeney Residence and Garage	8000
34	Sweeney Outbuilding	400



Base Layer is a 2004 NAIP (National Agriculture Imagery Program) image.
All boundaries and easement locations are approximate.

- Fire Department Siamese Connection
- Fire Hydrant
- Sweeney Addition
- Boundary Addition
- Buildings
- Park Trails
- Tour Road
- Park Boundary

N W E S

500 0 500 1000 Feet

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Values at Risk, Modern Improvements
Wilson's Creek National Battlefield

Bldg.	Name	Sq. Ft.
12	Carpenter Shop	1803
4	Mechanic Shop	871
13	Underground Water	180
16	Old Powder Storage	64
26	Portable Shed	180
21	Fire Cache	2250
22	Hazardous Materials Storage	105
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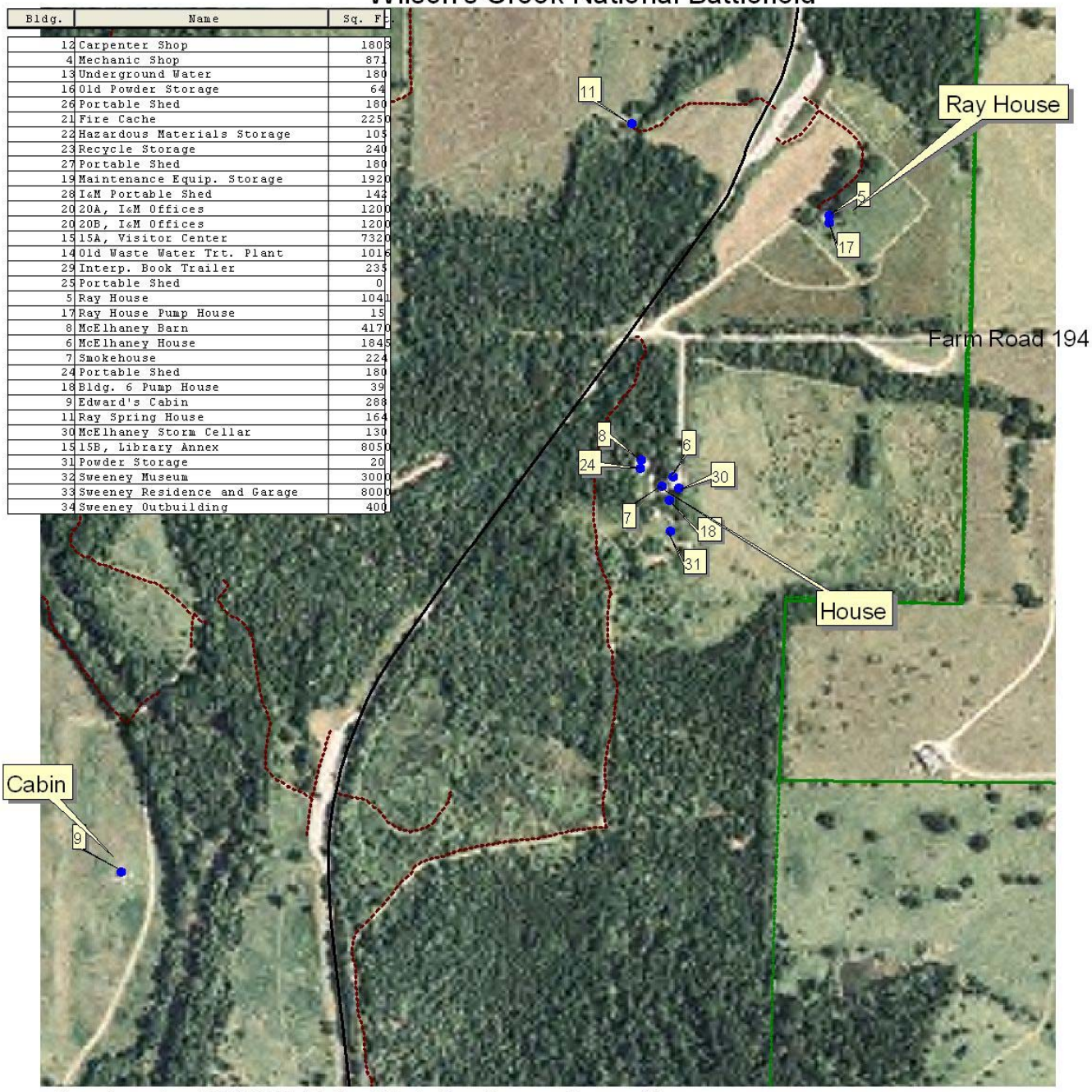


Base Layer is a 2004 NAIP (National Agriculture Imagery Program) image.
All boundaries and easement locations are approximate.

Sweeney Addition
Boundary Addition
Buildings
Park Trails
Tour Road
Park Boundary

N
W E
S

500 0 500 1000 Feet

FIGURE 16: BATTLEFIELD, MISSOURI WAS DESIGNATED AN URBAN WILDLAND INTERFACE COMMUNITY WITHIN THE VICINITY OF FEDERAL LANDS THAT ARE AT HIGH RISK FROM WILDFIRE. NATIONAL REGISTER FRIDAY, AUGUST 17, 2001.

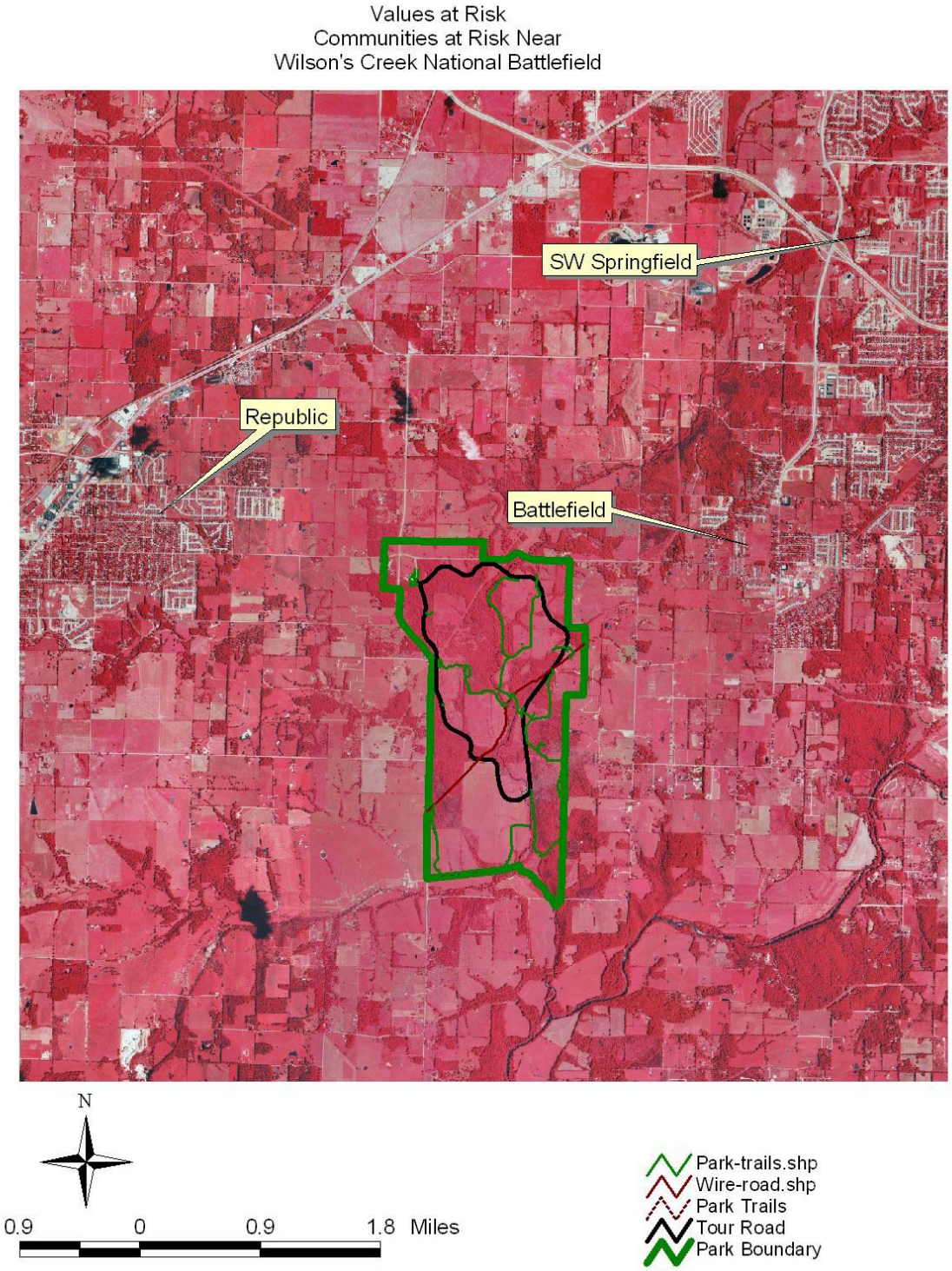


FIGURE 17

Vegetation

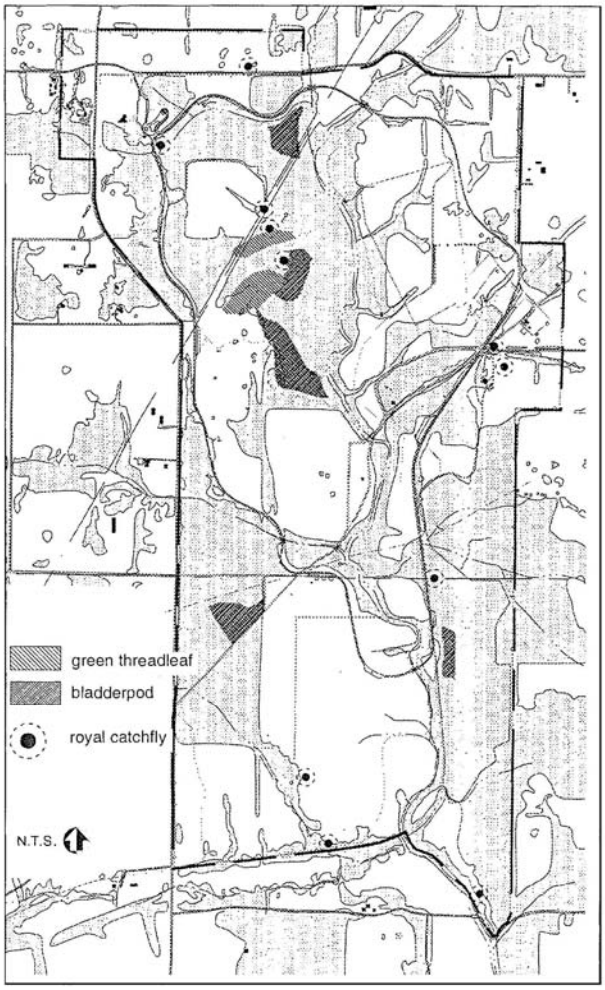


Figure 86. Threatened and endangered plant species locations.

IV. WILDLAND FIRE MANAGEMENT

A. GENERAL MANAGEMENT CONSIDERATIONS

1. GMP Direction

Current management is guided by the 2003 General Management Plan. The GMP states that "Preserving and retaining the historic character of the cultural landscape would be a priority; 718 acres, or 41 percent of the park, would be located in the Battlefield Landscape Enhancement zone, where visitors could envision the events of August 10, 1861. Data compiled in the draft cultural landscape report would enhance park management's effort to preserve the landscape's historic character. Recreational use would be allowed, but managed so as not to detract from the park mission, visitor experience, and efforts toward landscape rehabilitation".

In addition, the Resource Management Plan directs management toward the perpetuation of natural resources and the ecological processes involved to maintain the habitat. Cultural and historic resources are also to be protected.

The direction provided by these documents indicates that prompt, aggressive suppression actions will be the normal response to wildland fires on the Battlefield. Historically, few wildland fires have occurred on the area and this circumstance is likely to continue.

2. Implementation Procedures

A Wildland Fire Implementation Plan (WFIP) will be initiated for all wildland fires. This plan will provide the framework for determining the appropriate management response. The WFIP Stage I: Initial Fire Assessment will be the responsibility of the Incident Commander, the Area FMO, or the Park Fire Coordinator. As the park's Fire Management Unit only allows for suppression of unplanned ignitions, the requirement for a decision checklist as a part of the Stage I analysis can be considered met. Subsequently, Stage I analysis may be satisfied at the programmatic level in the FMP through determinations made by combinations of values to be protected and/or fire behavior thresholds. A copy of the WFIP Stage I form can be found in Appendix O.

B. WILDLAND FIRE USE

Wildland Fire Use will not be considered under this FMP for Wilson's Creek National Battlefield.

C. WILDLAND FIRE SUPPRESSION

1. Fire Behavior

NFFL model 9 (see Figure 10) fires generally consume leaf litter and top-kill small trees up to five inches in diameter. During extreme dry weather overstory trees may also be killed, particularly with the large accumulation of 100 hour fuels that have developed from years of fire protection. In the summer hardwoods fire effects are generally less severe, except many top-killed trees do not sprout as well after summer fires. No crown fires have been observed, but surface fires have occurred.

In the cedar glades, conditions tend to be dry year round and fire behavior would be driven by fuel moisture and to a lesser degree by wind.

NFFL model 8 (see Figure 10) fires are typically slow burning ground fires with low flame lengths. Only under severe weather conditions involving high temperatures, low humidities, and high winds do the fuels pose fire hazards.

NFFL model 3 (see Figure 10) fires can spread rapidly under dry, windy conditions, although areas of grass fuels are generally broken up by roads, trails, watercourses and the hardwood fuels. Generally only surface fuels are affected.

2. Preparedness

   a. Prevention – The objectives of the Battlefield's fire prevention program are: to prevent human caused wildland fires and, to incorporate prevention messages into interpretive programs. The Fire Prevention Plan is found in Appendix J.

   b. Annual Training – Annual refresher training to maintain MWCG fire qualifications will be made available to park staff. Minimum training will include LCES, Standards for Survival, fire shelter training and other updates as appropriate. In addition, each year the Chief of Resource Management and Fire Management Officer will assess the current qualifications of the unit's fire qualified personnel. From this assessment, current and future training needs for both the unit and individuals will be determined. Training will be obtained in the most cost-effective manner either in house or through interagency training courses. Qualified instructors will be utilized for all courses.

   c. Readiness – Each year prior to and after the fire season, the Chief of Resource Management will conduct an inventory of the unit fire cache. Any needed supplies or equipment will be requested through the Fire Management Officer. The Chief of Resource Management will also be responsible for ensuring that unit fire tools and equipment are maintained in a state of readiness, especially during the fire season.

   d. Fire Weather and Fire Danger

      (1). Weather Stations – The weather station is station number 237001, Wilson's Creek. NFDRS Model N is the selected model for fire danger predictions. This station is currently being converted to an FTS station.

      (2). NFDRS – WICR uses NFDRS Model N, Burning Index (BI) as the trend monitoring index and fire danger prediction scale. The Step-up Plan in Appendix H shows the break points for each individual staffing class along with the actions, both preparedness and prevention, required in each class.

      (3). Pre-Season Risk Analysis – When weather and fuels appear to be outside the expected parameters, a pre-season risk analysis will be conducted by the Ozark FMO. The items considered will include the items in the following table. Results should be passed on to the regional FMO for compilation and use for requesting additional funds and/or resources for wildland fire suppression.

Information developed from this analysis may be used to modify actions planned under various staffing classes in the Step-up Plan.

Table 5 - Pre-Season Risk Analysis

Pre-Season Risk Analysis		
Factor	**Current Level**	**Historic Average**
Temperature Levels (Highs)		
Temperature Levels (Lows)		
Precipitation Levels		
Keetch-Byram Drought Index		
1000 Hour Fuel Moistures		
Live Fuel Moistures		
Unusual Weather Events – Ice Storms, Hard Freezes		
Unusual Pre-Season Fire Load		
30-90 Day Temperature Forecast		
30-90 Day Precipitation Forecast		

e. Step up Plan –The Step-up Plan for Wilson's Creek describes the degree of response capability the park will undertake as fire danger increases. The plan is based on the 1978 National Fire Danger Rating System's burning index and components.

Weather observations will be taken at the fire weather station at Wilson's Creek daily via automated weather station. NFDRS fuel model N will be used as the primary model for rating fire danger. Weather observations and fuel measurements will be taken each burning period, and the NFDRS BI computed. Specific actions and trigger points are listed in the Step-up Plan in Appendix H.

3. Pre-attack Plan

The Pre-attack Plan is a checklist of items to be considered prior to wildland fire occurrence. The table is divided into four parts that correspond to four of the functions found in the Incident Command System and is found in Appendix G.

4. Initial Attack

a. Setting initial attack priorities involves determining the risk of fire to visiting public and firefighters, resources at risk, existing fires and threat to adjoining property. With multiple ignitions, priorities are: historic structures, NPS infrastructure, and natural habitats. All fires will be aggressively suppressed with due consideration of firefighter and public safety.

Maps of developed areas, historic, cultural and archeological resources are available in the natural resource office.

b. Normally initial attack crews will be comprised of at least two persons fully equipped with personal protective equipment. A radio and tools such as rakes, back-pack pumps, etc., will be carried in all patrol trucks. Additional gear such as engines, pumps, hose, fuel, etc. may be provided by back-up personnel as needed.

Small fires will be controlled, if possible by an initial attack handcrew. An initial attack crew on a larger fire will be reinforced by additional firefighters. If additional personnel or equipment are needed on the fire, the Incident Commander will notify the Chief of Resource Management who will arrange for additional suppression forces and/or personnel to be available for initial dispatch.

Should multiple fires occur, priority will be assigned to those that threaten park infrastructure, historic buildings, and other values at risk identified in Section III.C. When multiple fires occur, lower priority fires may be managed within natural or man-made barriers until sufficient suppression forces are available to take more aggressive action.

c. Confinement as an Initial Attack Suppression Strategy – Confinement strategies may be used on the Battlefield, in the opinion of the Initial Attack Incident Commander, direct suppression would put firefighters at risk due to terrain considerations, lack of adequate initial attack staffing or other safety issues. A confinement strategy may be selected for initial attack as long as it is not being used solely to meet resource management objectives. Resource benefits may be a by-product, but the strategy must be based upon the criteria listed above. A confinement strategy may also be selected in the WFSA process when initial attack has failed to contain a wildland fire.

If a confinement strategy is considered, it should be supported by completion of a Wildland Fire Implementation Plan (WFIP).

d. Response Times – For most fires, response time by NPS equipment and personnel will run up to 20 minutes depending on location of fire and responding personnel.

e. Management Constraints – The suppression tactics to be used at Wilson's Creek include use of water or foam firelines in conjunction with natural and man made barriers to reduce damage potential from suppression actions. Water will normally be supplied by engines operating from established roads and/or trails. There are several management constraints:

When fire lines must be constructed techniques requiring the least disturbance (i.e. leaf blown lines, mowed lines) will be used first. In extremely rare circumstances when less disturbing techniques are ineffective the use of bulldozers or heavy equipment in suppression operations may be authorized by the Superintendent or designee. The incident commander may authorize the use of heavy equipment if an immediate threat to human life exists. Engines will be restricted from areas identified as potentially affected by vehicle traffic where rutting, soil compaction or other habitat damage could occur.

- Handlines will be constructed only in areas where damage to archeological and/or historic resources is not likely to occur.

- Firefighter safety is a priority along the powerline (see figure 13), (69KV on wooden poles).
- Firefighter safety includes avoiding contact with water in Wilson's Creek as it is subject to contamination.
- Sensitive glade areas and historic sites must be protected using the least damaging tools and techniques.

f. Local Issues – Close communication with local units of government and adjacent landowners should reduce wildland fire controversy to a minimum. There are no known tribal issues. None were expressed during the GMP process, however, consultation will initiated during the public review period.

5. Extended Attack and Large Fire Suppression

a. Extended attack needs – Based on the fire history from 1982, few fires will remain uncontrolled past the first burning period. The largest fire on the area now included in the park was 27 acres in 1968.

Missouri DOC personnel may respond under a Memorandum of Understanding (mutual aid) if resources are available and not committed to their own suppression activities. Local fire departments are available and signatories to cooperative agreements (see Appendix E).

For large fires requiring large numbers of personnel or other resources, contact with the Missouri-Iowa Interagency Coordination Center will bring any necessary resources from sources nationally. The current contact information is found in Appendix E.

b. Implementation Plan Requirements – When a fire escapes initial attack, a new strategy must be developed to suppress the fire. This selection process is accomplished through the development of a Wildland Fire Situation Analysis (WFSA).

The WFSA is a decision process that employs a systematic and reasonable approach to determine the most appropriate management strategy for a particular situation. Reasonable management alternatives are identified, analyzed, and evaluated, and are consistent with the expected probability of success /consequences of failure. The Superintendent shall approve the WFSA and any revisions. Evaluation criteria include firefighter safety, anticipated costs, resource impacts, and social, political, and environmental considerations. The evaluation of alternatives becomes the triggering mechanism for re-evaluation of the WFSA.

A written copy of a WFSA can be found in Appendix N. An electronic version can be found at the U. S. Forest Service website at:

http://www.fs.fed.us/fire/wfsa/. (See attached document for a WFSA to include in appendices.

c. Complexity Decision – When a WFSA has been completed for use during the operations on a second burning period, the fire will be considered to be an extended attack fire.

d. Delegation of Authority – A sample delegation of authority to an incident commander is included in Appendix E.

6. Exceeding Existing WFIP

If the periodic reassessment of a WFIP indicates that a change in strategy is needed, the following actions will be taken:

a. If the fire is the result of an escaped prescribed fire, a Wildland Fire Situation Analysis will be completed and a new strategy selected based on the results.

b. If the initial attack appropriate management response was a confinement strategy and operations continue into a second operational period, a WFSA will be completed and new strategy selected if appropriate.

7. Minimum Impact Suppression Tactics (MIST)

Director's Order #18 states that: "Methods used to suppress wildland fires should minimize impacts of the suppression action and the fire, commensurate with effective control and resource values to be protected." Specific restrictions are listed in IV.C.4.e.

8. Fire Rehabilitation

On this unit the only rehabilitation needs anticipated are those associated with fireline construction and mop-up activities. Proper placement of hand constructed firelines should reduce the need for major work. Areas with handlines will be restored to their pre-fire condition as soon as possible. The nature of fires on the unit indicates that long-term rehabilitation should not be necessary. Should a Burned Area Emergency Rehabilitation Team (BAER) be required on the unit an archeologist or cultural resource specialist will be part of the team. Following are park specific guidelines:

a. Trash will be removed from lines, camp locations and other staging areas.

b. Should waterbars be necessary they will be installed every 70-200 feet for slopes 0 to 15%, 50-70 feet for 15-30%, and 30-50 feet for 30+% slope.

c. Stumps will be cut within 3 inches of the ground.

d. All snags or trees felled will be lopped and the branches scattered.

e. Rehabilitation should occur before resources are released from the fire to the greatest extent possible.

9. Records and Reports

The Superintendent is ultimately responsible for fire reporting and fiscal accounting. Individual report assignments may be made by the Superintendent. The table below is a checklist of possible wildland fire documents and the individual usually responsible for completing them.

Table 6 - Checklist - Wildland Fire

Checklist of Wildland Fire Documents and Reports Document Revision Or Preparation Frequency Responsible Party		
Frequency		
DI-1202	Each Incident	Incident Commander
WFSA	As Needed	Unit Management/IC
Fire Weather	Daily In Season	FMO
Fire Situation Report	Daily In Season	FMO
Fire Danger	Daily In Season	FMO
Fire Complexity Analysis	Per Incident As Needed	Incident Commander
Pre Season Risk Analysis	Annually	FMO/Chief Of Resource Management
Pre-Attack Plan	Annually	FMO/Chief Of Resource Management
Wildland Fire Critique	Each Incident	On Site Suppression Staff

Time and filing deadlines are associated with each of these reports and will control scheduling and response times.

V. FUELS MANAGEMENT

A. LONG-TERM FUELS MANAGEMENT

Over the period of this plan, Battlefield staff intends to implement a hazard fuels management program that includes the use of prescribed fire, mechanical treatment and herbicide application. In the long-term, the fire regime should be restored to a frequent, light occurrence to achieve the goals and objectives found on page 8.

The primary purpose of this program is to enhance natural resources on the unit, rehabilitate the cultural landscape, and protect historic structures and NPS infrastructure. Due to the increasing urbanization around the battlefield, prescribed fire will be carefully planned and executed due to the wildland-urban interface conditions.

Prescribed fire projects will be directed toward maintaining ecosystem health and protecting natural resources from catastrophic fires. Hazard fuels reduction will be one of the results of prescribed fire. As specific needs are identified, project proposals will be prepared and funding requested. The current proposed schedule is in Appendix I.

B. PRESCRIBED FIRE

1. Annual Preparation

A schedule of proposed prescribed fires will be developed and reviewed annually. The annual review will determine if fuel conditions are such that prescribed fire implementation can and should take place. As part of the review, past prescribed fire units will be examined to determine if the burn objectives over the long term are being achieved. Possible adjustments to return intervals, prescription parameters and climate conditions will also be reviewed.

2. Long-term Prescribed Fire Relation to FMU's

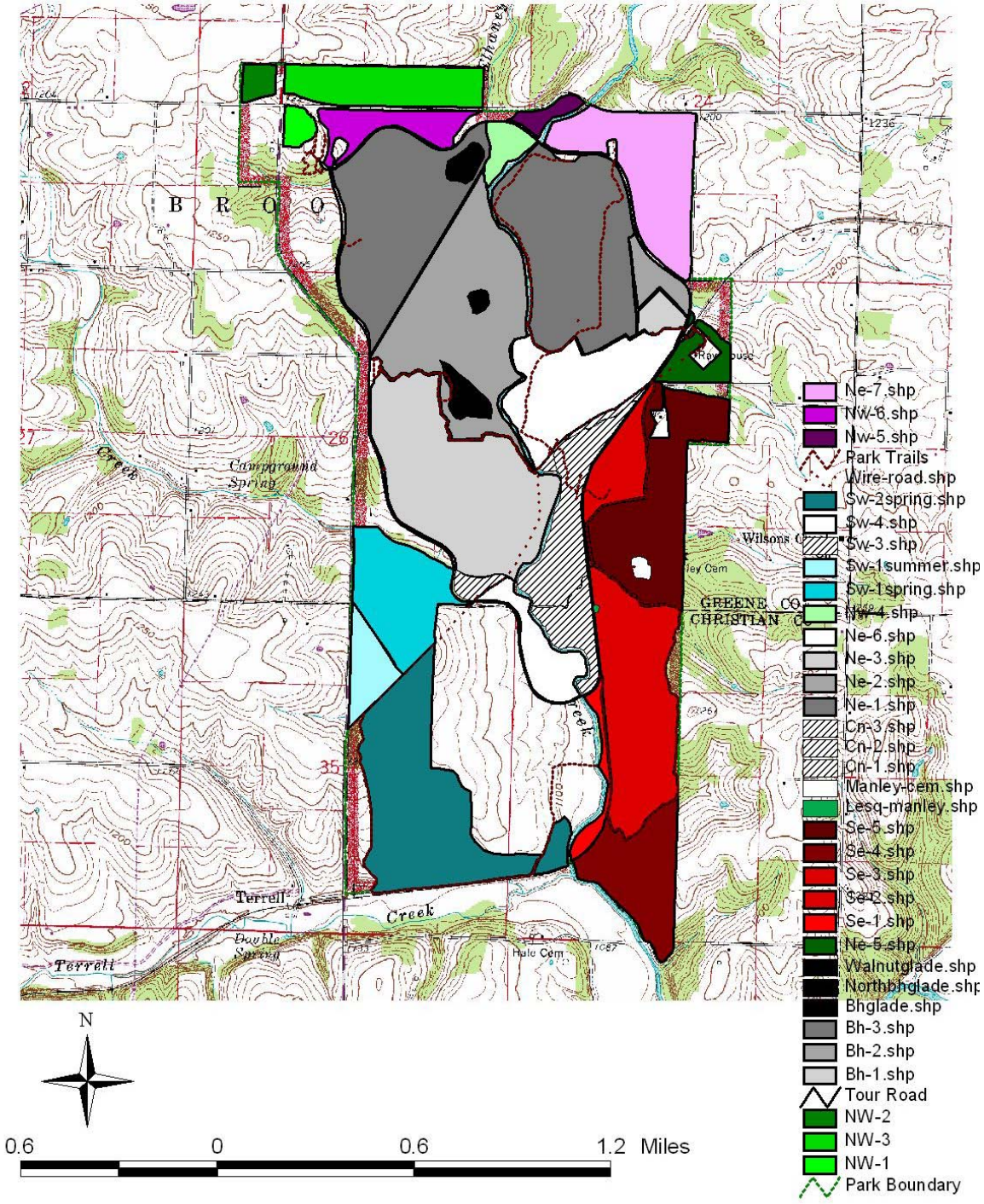
Prescribed Fire Units (PFU) have been identified (Figure 18). Multiple PFUs will be treated together to maximize the desired treatment and for cost efficiency. All PFUs are in the same fire regime and vegetative conditions vary only by cover type and future desired condition.

The draft Cultural Landscape Report recommends annual fall burning as a treatment. When asked to provide some quantitative information (i.e. fire scar data) to support this recommendation they indicated that fire scars are not reliable indicators of fire histories since trees were often not scarred by the low intensity fires that created the savanna landscape. Based upon a review of current fire history literature by the Chief of Resources Management, a compromise is in order. The mean fire interval that created and maintained the savanna landscape at Wilson's Creek National Battlefield was likely somewhere between 1 and 3 years. The treatment that is recommended to rehabilitate the savanna should be somewhere between 1 and 3 years. A one year treatment goal might be appropriate for areas of re-established warm season grass units that are in trouble (i.e. invaded by woody plants). A two to three year goal might be appropriate for a few areas of re-established warm season grass units that remain in stable condition. The Manley units and SW-1 and SW-2 are dominated by woodland vegetation, a two year treatment goal might be appropriate for those areas. Glades that support populations of Missouri Bladderpod might have a five year treatment goal. Of course to be effective prescribed fire treatments should be integrated with other management treatments. Specific

management recommendations are contained in Appendix I. This document will be updated annually.

FIGURE 18

Prescribed Fire Units
Wilson's Creek National Battlefield



3. Personnel Requirements

Qualified local staff will be utilized to the extent possible as the primary source of fire personnel. Fire qualified personnel from other units may be asked to assist on an ad hoc basis. As most prescribed fires are not expected to be more than moderately complex, from 10-20 personnel will be needed. A Burn Boss Type II is needed as well as an Ignition Specialist Type II, the remaining personnel would qualify as firefighters. However, staffing requirements may be revised by impending policy revisions, and the park will ensure that prescribed fire organizations conform to the appropriate standards.

4. Prescribed Fire Monitoring

Monitoring of prescribed fires at the park is intended to provide information for quantifying and predicting fire behavior and its ecological effects on the park resources while building a historical record. Monitoring measures the parameters common to all fires: fuels, topography, weather, and fire behavior. In addition, ecological changes such as species composition and vegetation structure will be monitored for several years after a fire. This information will be very useful in adjusting the prescribed fire program to better meet short and long-term resource objectives.

During prescribed burning, monitoring will include mapping, weather, site and fuel measurements, and direct observation of fire characteristics such as flame length, rate of spread, and fire intensity. Operational monitoring provides a check to insure that the fire remains in prescription and serves as a basis for evaluation and comparison of management actions in response to measured, changing fire conditions, and changes such as fuel conditions and species composition.

Fire weather and fire behavior will be monitored on all prescribed fires regardless of size. Fire effects on fuels and vegetation will be monitored on a parkwide basis according to NPS standards outlined in the NPS Fire Monitoring Handbook (FMH), 2002.

All prescribed fires will be monitored regardless of size. The Area Fire Ecologist will establish specific fire information guidelines for each fire to update intelligence about the fire.

The Prescribed Burn Boss will ensure that assigned qualified personnel are used to monitor prescribed fires. The most efficient utilization of personnel for fires of low complexity will be to utilize individuals with diverse experience (ignition, holding and monitoring). An efficient and flexible monitoring program is predicated by selection of the appropriate tactics, assessment of their potential, and the ability to characterize and quantify the resulting effects to determine if the fire is within prescription and is meeting identified resource goals and objectives.

Fire monitoring support will use protocols with adaptations described in the NPS Fire Monitoring Handbook (2003).

5. Critique of Prescribed Fire Operation The following items, as a minimum, will be reviewed following each prescribed fire operation.

- Were any unsafe acts noted?
- Were burn objectives met within an acceptable range of results? :
- What should be done differently to obtain desired results or get better results?
- Was there any deviation from plan? If so, why?
- Was prescription appropriate?
- Were weather changes a factor in accomplishing burn?
- Problems and general comments:

6. Documentation and Reporting

The following table lists the reports and other documents required for prescribed fire operations.

Table 7 - Checklist - Prescribed Fire

Checklist of Prescribed Fire Documents and Reports		
Document	Revision Or Preparation Frequency	Responsible Party
DI-1202	Each Incident	Incident Commander
NFPORS Project Submission	Annual	FMO
On-Site Fire Behavior/Effects Reporting	Each Incident	Rx Monitor
Fire Weather	Daily	FMO/Rx Monitor
Prescribed Burn Plan	Annually For Each Project	Burn Boss/FMO/Chief Of Resource Management
Fire Situation Report	Daily	FMO
Prescribed Fire Critique	Each Project	Project Staff
NFPORS Entry	Post Project	FMO

Time and filing deadlines are associated with each of these reports and will control scheduling and response times.

7. Historic Fuel Treatments

Maps depicting historic treatments are a part of the Battlefield's GIS, annual treatments can be found in APPENDIX M.

C. PRESCRIBED FIRE BURN PLAN

- Prescribed burn plan requirements at Wilson's Creek National Battlefield are similar to the requirements at other NPS units. A detailed outline and discussion is found in RM-18, Chapter 10 Exhibit 15.

D. EXCEEDING PRESCRIBED FIRE PLAN

In instances where the Escaped Fire Transition Plan is implemented, a WFSA will be completed and suppression action will be initiated based on the WFSA.

E. AIR QUALITY AND SMOKE MANAGEMENT

1. Air Quality Issues

There are multiple receptors for smoke. The area is a Class II air quality location and visibility is generally good. Residential development north, east, and west of the unit is increasing and those receptors are critical because of their proximity to prescribed fires. Additionally, the outer limits of the City of Springfield is only 6 miles to the northeast, in line with expected transport wind direction. The ability of the airshed to disperse the volume of smoke produced can be impaired occasionally. Due to the topography of the park, there is a tendency for residual smoke to settle into the creek bottoms potentially affecting visitors, employees and residents. Wildfires are normally of short duration and have little effect on air quality past the initial burning period.

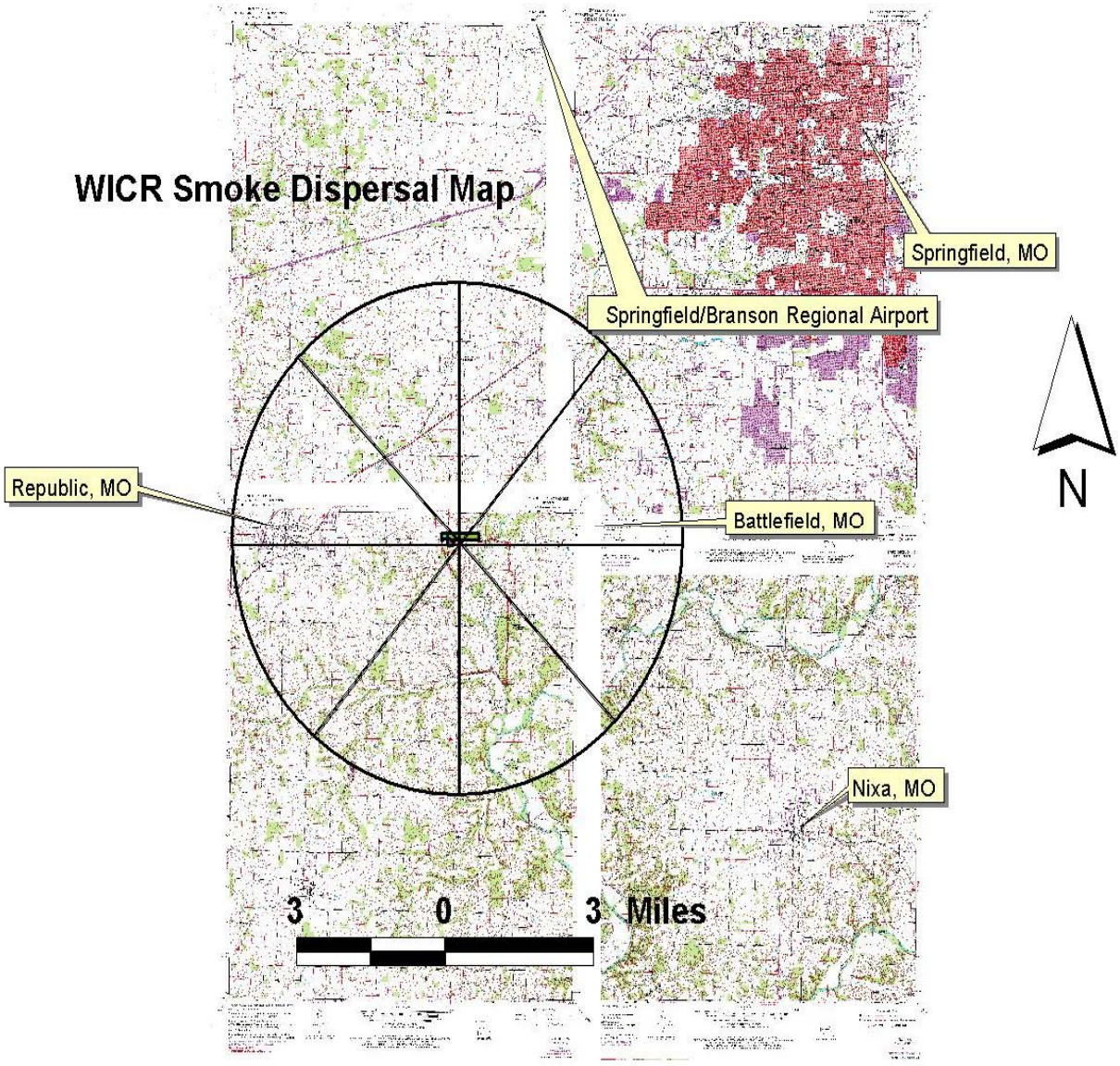
2. Smoke Management

Wilson's Creek is within an area of southwest Missouri that has open burning regulations issued by the Missouri Department of Natural Resources (MODNR) specific to Springfield and Greene County. The northern ⅔ of the battlefield lies in Greene County. The main emphasis of smoke management is the safety of motorists.

a. Class I Airsheds – The only Class I area in the state of Missouri is located about 40 miles south and east of the park on the Mark Twain National Forest. It is not expected to be affected by smoke production from prescribed fires on the Battlefield.

b. Smoke Sensitive Areas – The communities of Republic, Battlefield, Brookline and southwest Springfield contain multiple smoke sensitive targets. Included are two hospitals, two airports including Springfield-Branson Regional and approximately 20 nursing homes. The potential to have a major development adjacent to the park on ZZ highway with over 2000 homes is scheduled to begin in April 2005 and be completed by 2015.

FIGURE 19


WICR Smoke Dispersal Map
Springfield, MO
Springfield/Branson Regional Airport
N
Republic, MO
Battlefield, MO
Nixa, MO
3 0 3 Miles

c. Local/Regional Smoke Management Restrictions – There are no current restrictions on agricultural burning which includes prescribed fire. Open burning restrictions issued by the MODNR, however, are in effect in Greene County. Greene County requires a burning permit. Prescribed fire operations will be curtailed as needed when restrictions have been issued.

d. Mitigation Strategies

(1). Prescribed fires – Fires to improve resource values will have a smoke dispersion component in the prescription. If smoke creates a prolonged hazard or significant nuisance, appropriate actions will be taken to mitigate the condition causing the problem or the fire will be suppressed.

(2). Suppression – Smoldering fuels will be suppressed or mopped up when they are likely to generate smoke management "problems."

(3). Ignition – Smoldering fuels will be ignited to get them to burn with an active flame, which generates less than half the emissions than smoldering combustion. Flaming combustion also generates convection columns, which raise smoke above ground level.

(4). Types of Fires – The burn boss will use various firing techniques to mitigate for smoke, provide for firefighter safety, and avoid impacts to sensitive resources.

(5). Dispersion – The FMO and the Chief of Resources Management should try to recognize poor dispersion conditions that will last several days, such as the predicted passage of a slow-moving warm front; a lingering high pressure system with stable atmosphere; or high humidity conditions, and adjust burning strategies as necessary.

(6). Residual Smoke – When a fire has burned for an extended period of time and generated a lot of residual smoke, the NPS will consider appropriate actions to minimize additional smoke production.

(7). Firefighter Safety – During high smoke production phases of a fire suppression operation, crews will be rotated out of high smoke areas.

(8). Sensitive Areas – Planned prescribed fire ignitions in sensitive areas will be conducted either when visitation is low, or the Superintendent will restrict entry to areas potentially impacted by smoke.

e. Guidelines – The following are the management guidelines for all phases of the fire management program.

- No prescribed fires will be ignited during air pollution alerts, temperatures inversions or when a burn ban has been established by any local government.
- Prescribed fires will be conducted only when conditions result in rapid smoke dispersal.
- Proper firing techniques to lower smoke production will be utilized.
- Timing of prescribed fires will occur after 9:00 am with ignition ending before 5:00 pm.

- Smoke projection maps will be prepared to assist in projecting smoke dispersal patterns.
- Local police and fire agencies will be notified of any planned prescribed fire so they may provide any needed assistance with traffic flow should problems with smoke dispersal occur.
- Prescribed fires will be planned and conducted when proper wind flow will disperse smoke over unpopulated or low density populated areas.
- Federal Clean Air Act standards will not be violated by any prescribed fires.

F. NON-FIRE APPLICATIONS

1. Mechanical Treatment (see Appendix I for a detailed program description)

During the current planning horizon (2005-2012), several mechanical fuel hazard treatments are proposed on the unit. These projects are designed to remove a portion of the red cedar cover in the glade areas, clear a fire line around tornado damaged trees, reduce fuel loads in the tornado damaged area, and reduce stem densities of Chinese bushclover and annual brome grasses.

a. Annual Activities – Requests will be made through established channels during the prior year for funding to support the use of the module. Funding requests will be drafted by the FMO and the Chief of Resources Management on an annual basis, usually in the late summer. All requests will be approved by the Superintendent.

b. Seasonal Restrictions – Because the Missouri bladderpod exists in the glades, mechanical treatments are best completed prior to the active growth period. It is essential to the health of the plant populations to complete operations with ground disturbance prior to seed maturation in the fall.

c. Monitoring - Monitoring will concentrate on measurements of acres treated and stems removed. As soon as fire can be applied to the treated area, monitoring will be as defined in the Fire Effects Monitoring Plan (Appendix F).

d. Critique of Project – The following items, as a minimum, will be reviewed following each mechanical treatment.
   - Were any unsafe acts noted?
   - Were treatment objectives met within an acceptable range of results? :
   - What should be done differently to obtain desired results or get better results?
   - Was there any deviation from plan? If so, why?
   - Were weather changes a factor in completing treatment?
   - Problems and general comments:

e. Cost Accounting – Records of costs associated with the project will be kept by the unit administrative assistant.

f. Documentation and Reporting – The following table lists the reports and other documents required for prescribed fire operations.

Table 8 - Checklist - Mechanical Treatments

Checklist Of Mechanical Treatment Documents And Reports		
Document	Revision Or Preparation Frequency	Responsible Party
NFPORS Project Submission	Annual	FMO
On-Site Effects Reporting	Each Project	Monitor
Project Plan	Annually For Each Project	FMO/Chief Of Resource Management
Project Critique	Each Project	Project Staff

Time and filing deadlines are associated with each of these reports and will control scheduling and response times.

g. Annual Project List – The list is found in Appendix I

2. Chemical Treatment (see Appendix I for a detailed program description)

Several chemical treatments are planned. These will occur in areas where Chinese bushclover has invaded. This exotic is being treated both with herbicide and mowing in an effort to reduce coverage. Fire will be applied once the plant is under control in an effort to restore the habitat to a more native plant composition.

a. Annual Activities – Each project will require the normal approval process for herbicide use. Application will be done by the integrated pest management coordinator for the park.

b. Seasonal Restrictions – Treatments will be restricted to the season and condition of the pesticide label.

c. Monitoring –Monitoring will concentrate on measurements of acres treated and percent of plant kill achieved. As soon as fire can be applied to the treated area, monitoring will be as defined in the Fire Effects Monitoring Plan (Appendix F).

d. Critique of Project – The following items, as a minimum, will be reviewed following each chemical treatment.
- Were any unsafe acts noted?
- Were treatment objectives met within an acceptable range of results? :
- What should be done differently to obtain desired results or get better results?
- Was there any deviation from plan? If so, why?
- Were weather changes a factor in completing treatment?
- Problems and general comments:

e. Cost Accounting – Records of costs associated with the project will be kept by the unit administrative assistant.

f. Documentation and Reporting – The following table lists the reports and other documents required for prescribed fire operations.

Table 9 - Checklist - Chemical Treatments

Checklist Of Chemical Treatment Documents And Reports		
Document	Revision Or Preparation Frequency	Responsible Party
NFPORS Project Submission	Annual	FMO
On-Site Effects Reporting	Each Project	Monitor
Project Plan	Annually For Each Project	FMO/Chief Of Resource Management
Project Critique	Each Project	Project Staff

Time and filing deadlines are associated with each of these reports and will control scheduling and response times.

g. Annual Project List – The list is found in Appendix I

VI. FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

A. FIRE ORGANIZATION STRUCTURE

1. Superintendent or Designee

Responsible for the overall program direction. Has final decision making authority for management operations. Approves and signs Interagency Agreements pertaining to the park.

2. Fire Management Officer

Functions as technical advisor for the park fire management program, assigned to Ozark National Scenic Riverways. The Fire Management Officer will coordinate FIREPRO budget requests and tracking and provide oversight for employee fire training, qualifications, and planned prescribed fires.

3. Chief – Resources and Facility Management

During any fire operations, wildland fire or prescribed fires, will act as liaison between NPS personnel, other agencies and general public. Individual also functions as Initial Attack Incident Commander. The Coordinator also serves as park contact with FMO, communicates burning conditions and fire information, maintains fire equipment and cache.

4. Park Ranger

May function as Initial Attack Incident Commander and/or as firefighter as qualified.

5. Administrative Technician

Provide administrative support in procuring any needed supplies and equipment, responsible for proper documentation of personal services.

6. Facility Management Staff

Provide technical assistance in area of suppression equipment available to include light tools and knowledge in locating known utilities and services. May function as Initial Attack Incident Commander and/or as firefighter as qualified. One maintenance staff member is the engine boss for the park.

B. FIREPRO FUNDING

FIREPRO funding is available for approved equipment needs and prescribed fire operations. Fuels project proposals are submitted through NFPORS for funding and approval. No staffing is funded by FIREPRO.

C. FIRE ORGANIZATION STRUCTURE RELATED TO PARK ORGANIZATION

1. Superintendent or Designee

Responsible for the overall program direction. Has final decision making authority for management operations. Approves and signs Interagency Agreements pertaining to the unit. Approves WFSAs for escaped wildland fires or prescribed fires.

2. Fire Management Officer

The Fire Management Officer will oversee all suppression operations and planned prescribed fires and is responsible for day to day fire management operations at the park level. Coordinates operations with Chief – Natural Resource Management.

3. Chief – Resources and Facility Management

During any fire operations, wildland fire suppression, or planned prescribed fires, will act, with the prevention-education specialist, as liaison between NPS personnel, other agencies and general public.

4. Fire Ecologist

FIGURE 20

Wilson's Creek National Battlefield
Prescribed Fire Organizational Structure

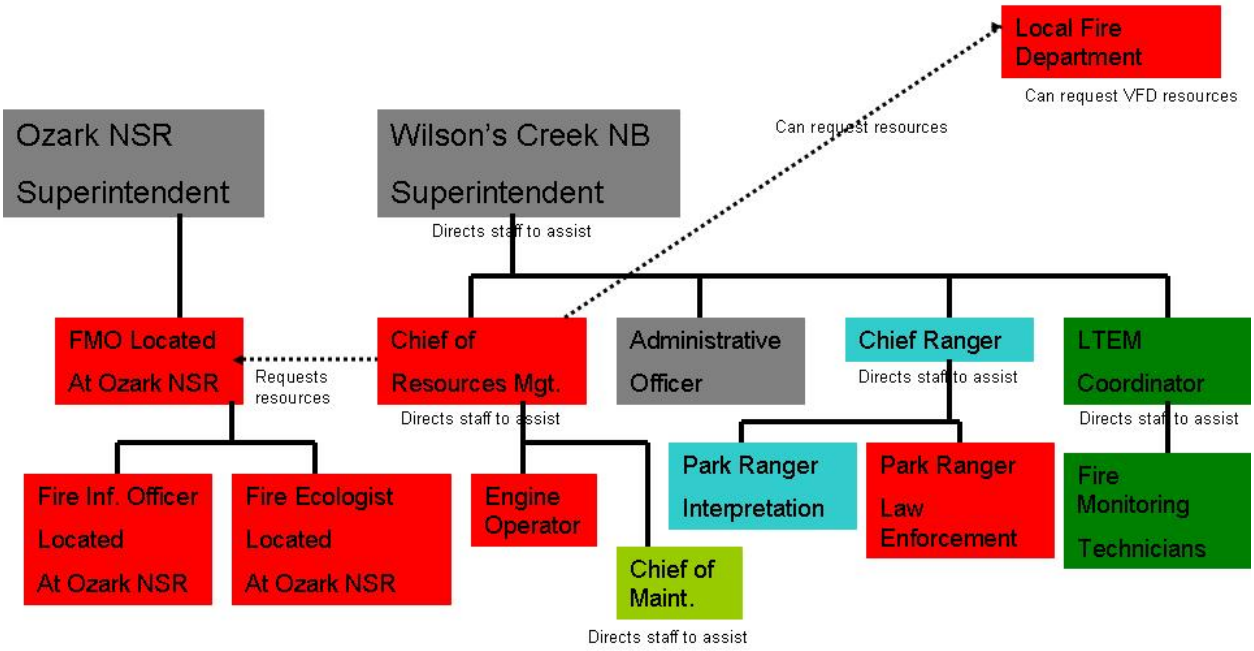
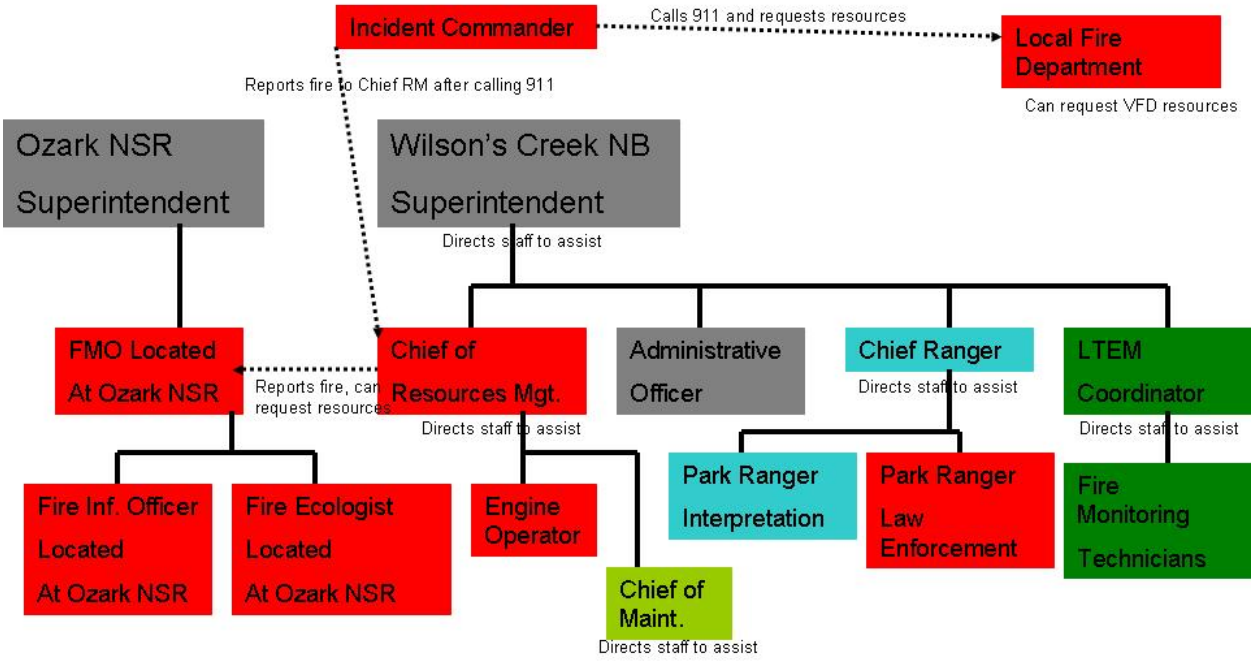


FIGURE 21

Wilson's Creek National Battlefield
Wildfire Organizational Structure



D. INTERAGENCY COORDINATION AND AGREEMENTS

The Battlefield maintains a good working relationship with local Fire Departments, and the Missouri Department of Conservation.

The Missouri-Iowa Interagency Coordination Center is managed by the Mark Twain National Forest and can be contacted for assistance at any time circumstances dictate. This contact will bring any resources necessary to the assistance of the Battlefield. The center is located at Rolla, MO and can be reached at (573) 364-4621.

E. KEY INTERAGENCY CONTACTS

TABLE 10:

Mandatory Contact List: All persons or entities on this list will be contacted prior to ignition.

Name	Agency	Phone Number	Date Notified
Dispatcher	Green County Sheriff	(417)868-4040	Burn day
Dispatcher	Christian County Sheriff	(417)581-2332	Burn day
Dispatcher	Missouri State Patrol	(417)895-6868	Burn day
Dispatcher	Battlefield VFD	(417)868-4040	Burn day
Dispatcher	Clever VFD	(417)868-4040	Burn day
KAMO Electric Coop	Vinita, OK	(918)256-5551 x217	2 days prior
U.S. Forest Service	Mark Twain N.F., Ava District	(417)683-4428	Burn day
Barnes, Richard	Air Pollution Control Dept., Missouri Dept. of Natural Resources, Springfield, MO	(471)891-4328	1 week prior
Parker, Duane	State Forester, Missouri Dept. of Conservation, Springfield, MO	(417)895-6880	

Optional Cooperator Contact List: Every effort will be made to contact these cooperators before ignition, however , notification is optional and is not required.

Name	Agency	Phone Number	Date Notified
Davis, William	Director, National Weather Service	869-4491 or 863-7889	1 week prior
Shumway, Steve	National Weather Service	869-4491 or 863-7889	1 week prior

Optional Media Contact List: Every effort will be made to contact these members of the media by phone before ignition, however, notification is optional and is not required.

Name	Agency	Phone Number	Date Notified
Newsroom	KWFC Radio	869-0891	1 week prior
Newsroom	KY3 TV	268-3299 or 268-3200	1 week prior
Newsroom	KSMU	836-5878	1 week prior
Newsroom	KTTS	869-2153	1 week prior
Newsroom	KOLR TV	862-1010	1 week prior
Newsroom	KSPR TV	831-1234	1 week prior

F. FIRE-RELATED AGREEMENTS

Wilson's Creek National Battlefield has three current fire related agreements. One is an inter-park agreement with parks in Missouri, Kansas, Nebraska, and Iowa. The other two are with the two local Fire Protection Districts that cover areas in or near the park. Brookline Fire Protection District provides most of the wildland fire and structural fire support for the park. The district provides protection for 35 employees, 200,000 visitors each year, and

protects approximately 1500 acres of the park, including 26 structures. Clever Fire Protection District provides wildland fire protection for approximately 250 acres of the park, and protects an urban interface that is one of the fastest growing in the State of Missouri. Both districts provide support to a wildland urban interface that has experienced a 15-66% growth rate over the last 10 years. This is one of the fastest growth rates in the State of Missouri. Current agreements are located in Appendix E

Table 11 - Local Cooperators

Fire Department List (by county

Tuesday, August 03, 2004

	Dept Name	Mailing Address	City	Zip	Chief	Daytime Phone	FDID
CHRISTIAN	BILLINGS FIRE PROT DIST	P O BOX 318	BILLINGS	65610	HENRY BOS	417-744-4228	02207
CHRISTIAN	CHADWICK RURAL FIRE DEPARTMENT	P.O. BOX 221	CHADWICK	65629	MARK LOVELAND	(417) 634-2029	02205
CHRISTIAN	CLEVER FIRE PROTECTION DISTRICT	P O BOX 192	CLEVER	65631	DAVID HABERICHTER	4173692475	02203
CHRISTIAN	HIGHLANDVILLE FIRE PROTECTION DIST.	P.O. BOX 26	HIGHLANDVILLE	65669	EVAN GILBERT	417-587-3652	02201
CHRISTIAN	NIXA FIRE PROTECTION DISTRICT	301 S. NICHOLAS RD	NIXA	65714	JIMMY SEBREE	417-725-4025	02204
CHRISTIAN	OZARK FIRE DEPARTMENT	602 N. 3RD ST	OZARK	65721	JAKE ARCHER	(417) 581-4515	02202
CHRISTIAN	OZARK RURAL FIRE PROT. DIST.	P O Box 917	OZARK	65721	JAKE ARCHER	(417) 583-3439	02206
CHRISTIAN	SPARTA FIRE PROTECTION DIST.	P. O. BOX 250	SPARTA	65753	DOUG FAVOR	4172071678	02208
GREENE	ASH GROVE FIRE PROTECTION DISTRIC	P.O. BOX 155	ASH GROVE	65604	MIKE DAVIS	(417) 751-3300	03916
GREENE	BATTLEFIELD FIRE PROTECTION DIST.	4117 W. SECOND ST.	BATTLEFIELD	65619	JERRY SPARKMAN	417-881-9018	03901
GREENE	BOIS D' ARC FIRE PROTECTION DISTRIC	10505 W. STATE HWY	BOIS ARC	65612	BRUCE MULLEN	(417) 742-3884	03904
GREENE	BROOKLINE FIRE PROT. DIST.	P.O. BOX 467	BROOKLINE	65619	LARRY MCCONNELL	(417) 882-2014	03903
GREENE	DEPT OF CONSERVATION REGIONAL FO	2630 N. MAYFAIR	SPRINGFIELD	65803			
GREENE	EBENEZER FIRE PROTECTION DISTRICT	7918 N FR 146	SPRINGFIELD	65803	VINCE EDWARDS	(417) 833-0128	03908
GREENE	FAIR GROVE FIRE PROT. DIST.	P. O. BOX 103	FAIR GROVE	65648	RON LONG	417-759-2628	03913
GREENE	LOGAN-ROGERSVILLE FIRE PROT. DIST.	3427 S. ST HWY 125	ROGERSVILLE	65742	RICHARD STIRTS	(417) 753-4265	03911
GREENE	PLEASANT VIEW FIRE PROTECTION DIST	2313 E. STATE HWY A	SPRINGFIELD	65803	CHRIS HENSON	(417) 833-9775	03912
GREENE	REPUBLIC FIRE DEPARTMENT	701 US HWY 60 EAST	REPUBLIC	65738	DON MURRAY	417-732-1950	03902
GREENE	SPRINGFIELD FIRE DEPARTMENT	830 N. BOONVILLE R	SPRINGFIELD	65802	STEVE STRADER	417-864-1500	03907
GREENE	STRAFFORD FIRE PROT. DIST.	P.O. BOX 9	STRAFFORD	65757	JEROME SCHIMAN	(417) 831-3933	03909
GREENE	WALNUT GROVE FIRE PROT DIST	109 N. WASHINGTON	WALNUT GROVE	65770	JIM CUMMINS	(417) 788-2670	03906
GREENE	WEST REPUBLIC FIRE PROT. DIST.	11088 W. FR 168	REPUBLIC	65738	ERIC GHAN	417-732-7183	03914
GREENE	WILLARD FIRE PROT. DIST.	P.O. BOX 455	WILLARD	65781	GARY WIRTH	417-742-2525	03905

FIGURE 22

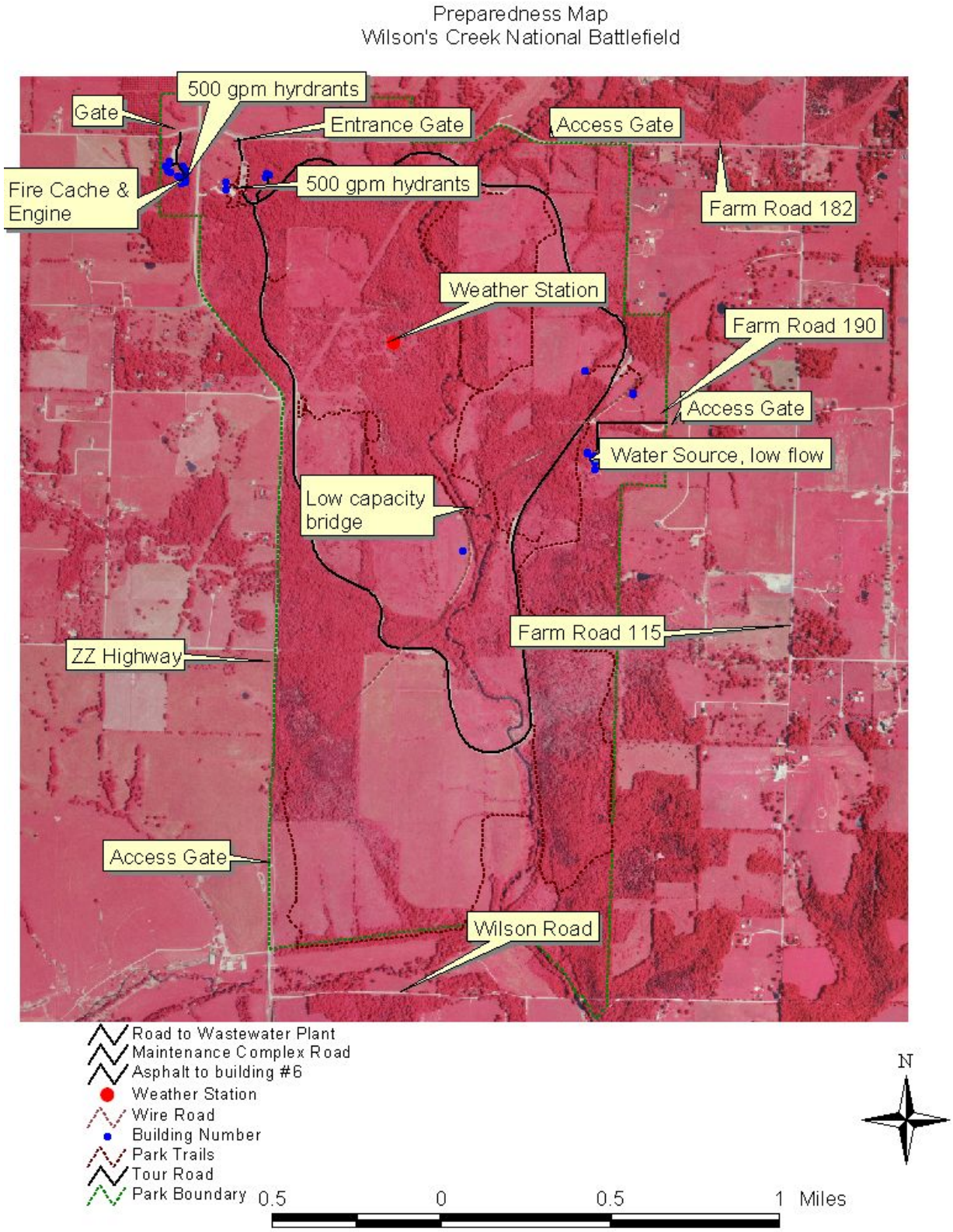
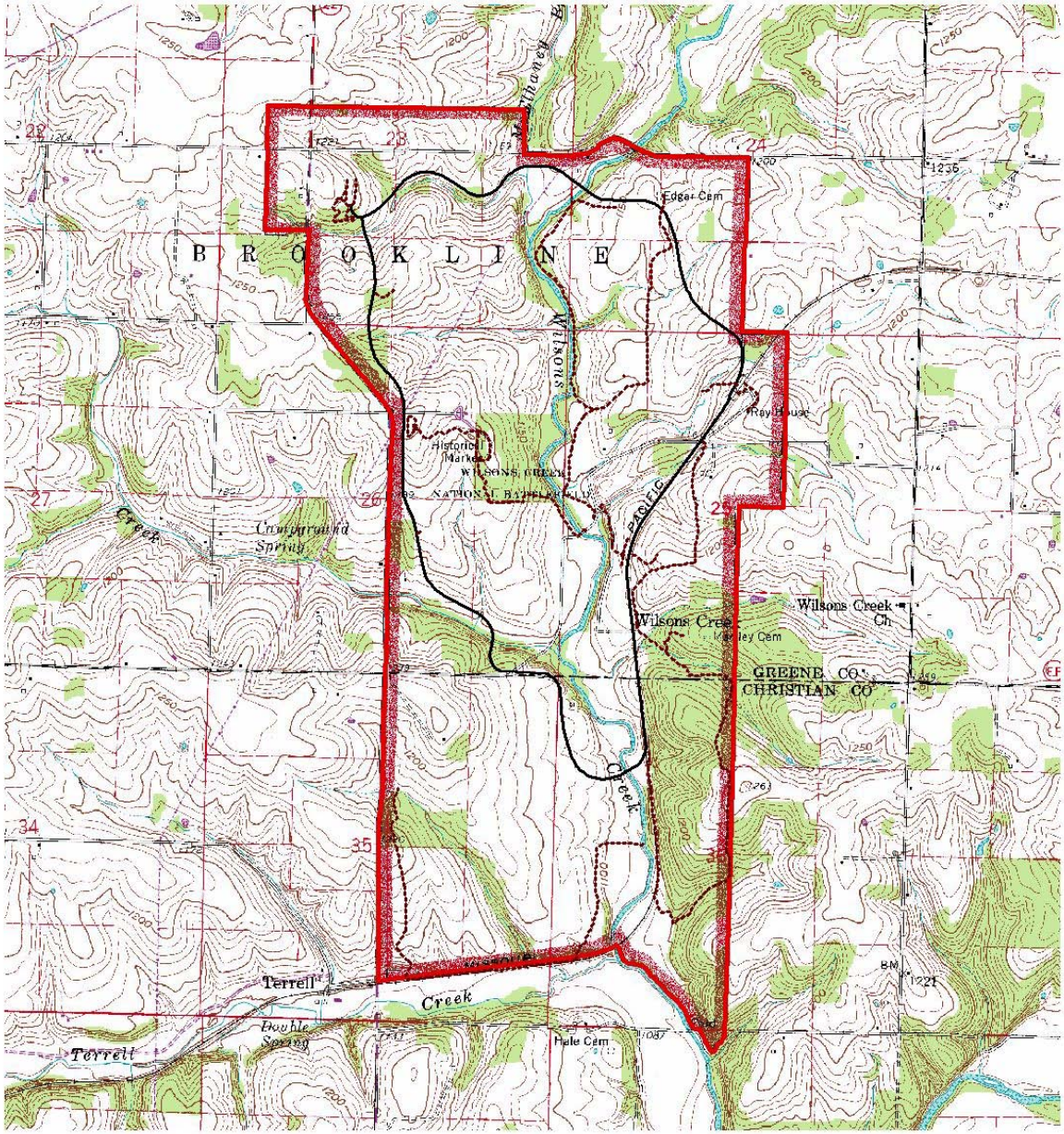

Preparedness Map
Wilson's Creek National Battlefield
500 gpm hyrdrants
Gate
Entrance Gate
Access Gate
Fire Cache & Engine
500 gpm hydrants
Farm Road 182
Weather Station
Farm Road 190
Access Gate
Water Source, low flow
Low capacity bridge
Farm Road 115
ZZ Highway
Access Gate
Wilson Road
Road to Wastewater Plant
Maintenance Complex Road
Asphalt to building #6
Weather Station
Wire Road
Building Number
Park Trails
Tour Road
Park Boundary
N
0.5
0
0.5
1 Miles

FIGURE 23

Maximum Manageable Area
Wilson's Creek National Battlefield



Total Acreage 1,750 acres

Park Trails
Tour Road
Maximum Manageable Area

0.6 0 0.6 1.2 Miles

N

VII. FIRE RESEARCH

A. PREVIOUS AND ONGOING FIRE RELATED RESEARCH

Cultural resource and historic landscape surveys have been completed. In addition, a hydrology study was completed that produced the concern about contact with water from Wilson's Creek due to contamination from Springfield Wastewater Treatment Plant upstream from the park.

B. FIRE RESEARCH NEEDS

For future research, two types of research are needed.

1. Fire Effects

Studies to determine the effects of fire or fire exclusion on the endangered Missouri bladderpod are needed. Also needed are studies to determine the effects of fire or fire exclusion on "glades" within the park. The effects of fire on exotics should be studied to ensure fire operations do not unwittingly enhance the growth or spread of exotic plants (i.e. Chinese bushclover).

2. Fire History

A study of long-term fire history of the area is needed to be able to adequately mimic the fire regime to achieve fire management goals.

VIII. MONITORING

A. PROGRAMS

Fire effects monitoring will be undertaken though the Prairie Cluster LTEM program. the program is not fully realized due to a lack of support from FirePro. Upon full funding, vegetation monitoring would be expanded to adequately cover all fire adapted ecosystems, and data will be analyzed specifically to examine the effects of prescribed fire, and to determine if prescribed fire objectives are being met, and if unwanted effects are occurring.

1. Short-term monitoring

The definition of short-term monitoring as used on this unit is monitoring done to measure vegetative response, fuel reduction and other measurable changes occurring immediately following fire application.

2. Long-term Monitoring

Long-term monitoring is defined as that level of effort required to track changes in vegetative composition, wildlife use, vista maintenance or other changes occurring over a multi-year period.

B. MONITORING HANDBOOK

The Fire Monitoring Plan is designed to provide guidance in establishing and implementing sound fire monitoring protocols at Wilson's Creek National Battlefield while complying with the NPS Fire Monitoring Handbook (2003). The protocols will be used to:

- assess fire behavior (both prescribed fire and wildfire);
- determine whether the resource management objectives of prescribed fire are being met;
- determine whether the fire regime is producing unintended negative impacts.

C. FIRE MONITORING PLAN

The Monitoring Plan, when completed, will be found in Appendix F. It will discuss in detail the level of effort for each habitat to be monitored. Included are specific results desired to measure goal achievement in the various habitats.

IX. PUBLIC SAFETY

A. ISSUES AND CONCERNS

The primary safety concerns are homes and businesses adjacent to the Battlefield. Most homes have fuel breaks, roads, driveways, and lawns around them. All fire management projects will be conducted with public safety as a primary objective. The priority for such projects will reflect the Battlefield's commitment to mitigating hazard fuel build-up and preventing wildland fire escapes into adjoining residential areas.

A second concern is the safety of visitors within the unit, driving or hiking along the tour route. To a lesser degree there is a hazard from smoke on the tour route traversing the Battlefield. For the most part the roads are not overly wide and carry a fairly heavy traffic load, especially during the summer months. Movement away from fire areas should not be too difficult. Management of off-site residential traffic will require assistance from local or county authorities.

B. MITIGATION

In order to make Service employees and the general public aware of such hazards, the following mitigation measures will be considered:

- General public will be made aware of wildland fires and prescribed fires through press releases and general interpretive presentations.
- The general public will not be allowed access to any areas affected by fire.
- Safety briefings will be conducted for NPS personnel prior to any participation in wildland suppression or prescribed burns.
- Appropriate regulatory and/or enforcement agencies will be notified prior to any prescribed burns to assist in safely managing pedestrian, equestrian or vehicular traffic. Warning signs will be posted along roads and trails as necessary.

X. PUBLIC INFORMATION AND EDUCATION

A. CAPABILITY AND NEEDS

The park will conduct a fire prevention program with appropriate emphasis prior to the fire season and during high-risk periods. This will primarily be an effort to communicate through media and public contacts a greater awareness of wildland fire prevention. Signing will be used at strategically located points throughout the park to indicate high-risk periods.

Emphasis will be placed on interpreting the role of fire as a natural process, and on prescribed fire as a restoration tool. The common and long-term use of prescribed fire by the Battlefield has made the public reasonably receptive and informed regarding prescribed burning.

To further public information and education, the following guidelines will be followed:

- Timely and accurate information will be provided to the media and Battlefield visitors regarding the status of fire actions and suppression efforts.
- Informational handouts explaining the fire management program will be prepared and updated as necessary. During periods of prescribed burning, these handouts will be distributed to both visitors and local residents.
- The prescribed burn program, plans and implementation will be discussed in informal contacts with all unit personnel. Reasonable attempts will be made to contact neighbors and visitors.
- Adjacent landowners will be notified when fire, particularly wildland fire, is a threat to off-unit residential areas.
- Interpretive exhibits and programs occur in season whenever opportunities allow.

B. RESPONSE TO INCREASING FIRE ACTIVITIES

When the staffing class is at SC-4 or SC-5, information will be prominently displayed at visitor contact points. Patrol activity may be increased to detect potential fires and to monitor visitor activity. At SC-5 it may become necessary to close portions of the Battlefield to protect the public.

XI. PROTECTION OF SENSITIVE RESOURCES

A. ARCHEOLOGICAL/CULTURAL/HISTORIC RESOURCES

1. Resources

There are numerous archeological and cultural resources to be protected throughout the unit. Historic properties are generally located along the east side of the Battlefield. The entire unit is a National Register property and a cultural landscape. Every effort will be made to protect archeological sites both known and those discovered as a result of fire on the landscape. Because many of the historic and cultural areas are near roads protection from wildland fire should not be difficult.

Cultural and archeological sites are generally at or below ground surface and subject to more damage from suppression actions than fire itself. Buenger (2004) found that prescribed fires in grassland fuels has a limited impact on surface archaeological materials. Thermal alteration of artifacts analyzed from the Homestead and Pipestone National Monument collections, which were subjected to prescribed burning in grassland fuels, was not significant.

2. Mitigation

In all locations every effort will be made to avoid damage to identified resources during suppression and prescribed fire operations. Archeologists or cultural resource specialists will be involved in all operations to the maximum extent feasible.

B. NATURAL RESOURCES

1. Resources

The natural resources most at risk from wildland fire at Wilson's Creek are the glades vegetation and endangered Missouri bladderpod. Generally bladderpod is found in the glades habitat. The species is adapted to disturbance, including fire, but seasonality of fire is the critical consideration. No endangered animal species are known to be at risk.

2. Mitigation

Ignitions in all habitats will be managed with the least disturbance possible. The glades areas will be protected from unnecessary ground disturbance to the greatest extent possible.

Missouri bladderpod is the Federally listed species that could be negatively impacted by wildfires. Wildland fires in glade habitats from late October through June may adversely affect the plant. In order to mitigate potential impacts of fuel treatment projects park staff will:

- Suppress all wildland fires.

Conduct prescribed fires mechanical and chemical fuel treatment between the dates of July 1 and October 15th. The only exception will be annual brome control. Brome grasses will be mechanically controlled by cutting the seed heads off the plant at the dough stage, typically from April 15 – 30. This work will be accomplished by hand under close supervision to limit damaging the flowers of Missouri bladderpod and therefore prevent adverse impacts. Continue to monitor the species and use adaptive management to improve the management of habitat for the species.

Smoke from fires could impact gray bats hibernating in caves. In order to mitigate potential impacts park staff will:

- Suppress all wildland fires.
- Continue to restrict access to caves within Wilson's Creek National Battlefield.
- Resources Management staff will check caves yearly for the presence of Gray bats. Report yearly findings to the U.S. Fish and Wildlife Service and the Missouri Department of Conservation.
- Designate a 300 foot buffer zone around the cave that harbored Gray bats in 1996. No vegetative disturbance will be allowed including burning within this zone.
- Check caves for the presence of Gray bats before conducting prescribed fires. If bats are confirmed present prescribed burning activities will be conducted between 9:00 am and 4:00 pm under conditions of a mixing height of at 2,000 feet to permit maximum smoke dispersal.
- Maintain a continuous corridor of trees at least one canopy wide (based on the canopy of a typical mature, bottomland, hardwood species) on both sides of Wilson Creek.

In rare (cold winter) cases bald eagles roost in several trees along Wilson Creek while feeding. Park staff will not cut standing trees along Wilson Creek unless they present an immediate safety hazard.

C. INFRASTRUCTURE

1. Improvements

Most of the NPS operation infrastructure is located in the northwest corner of the unit. Historic buildings are basically found in the northeast ¼ of the unit. Wooden bridges are found in several locations and need protection, particularly from wildland fire. A table listing historic buildings is found in Section III.C.2. A similar table for NPS infrastructure is found in Section III.C.3.

2. Mitigation

In the case of the historic buildings and other NPS assets the following maintenance operations will assist in protecting these assets. The grounds around modern buildings will be kept mowed, the cultural landscape around historic structures will be maintained, and trails and roadsides will be mowed. Wooden bridges and fence lines may require additional fuel reduction prior to each project burn.

XII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

A. INTRODUCTION

1. Scope

All wildland fires and fire-related incidents will be reviewed. All prescribed fires will be reviewed as appropriate.

2. Reviews

Reviews are conducted for one or more of the following purposes:

a. To examine the progress of an on-going fire incident and to confirm effective decisions or correct deficiencies.

b. To identify new or improved procedures, techniques or tactics.

c. To compile consistent and complete information to improve or refine park, regional or national fire management programs.

d. To examine anomalous fire-related incidents in order to determine cause(s), contributing factors, and where applicable, recommends corrective actions. If negligence is indicated, the circumstances will be reported and investigated in accordance with applicable regulations, policies or guidelines.

e. To determine the cost effectiveness of a fire operation.

3. Authority

The authority to convene a fire review rests with the park superintendent, regional director, or the Associate Director, Park Operations and Education. It is the clear responsibility of the superintendent to call for a review, to insure timely completion, and to implement recommended actions. The regional director has responsibility to follow-up with the superintendent: that reviews are established and completed in a timely manner, and that recommended actions are completed. The superintendent may request technical support from Fire Management Program Center, regional, park or interagency personnel with the appropriate expertise.

4. Incident Types

All wildland fire incidents which result in human entrapment, fatalities, or serious injuries, or result in incidents with potential, will be investigated and reviewed.

5. Associate Director

The Associate Director, Park Operations and Education, will convene an ad-hoc team to review Service-wide fire management programs subsequent to the occurrence of any significant, controversial or unusual wildland fire management activities.

6. Purpose

All reviews will be conducted as constructive critiques aimed at determining the facts related to the specific fire or fire management program. They will identify commendable actions, techniques and decisions as well as areas which need improvement. Reviews are intended to resolve operational issues, not impose punitive actions.

B. FIRE REVIEWS

1. "Hotline" Review

The purpose of the hotline review is to examine the progress of an on-going fire incident, regardless of size. The review will provide a confirmation of the decisions being made daily in the Wildland Fire Situation Analysis or determine where the decision process has been faulty and corrective actions are needed.

The "hotline" review is normally conducted by the park's fire management officer (or an official who has designated fire program management responsibilities) in conjunction with the incident commander on the fire.

These reviews require no special reporting. Documentation of "hotline" reviews should be included in the normal fire report narrative.

2. Incident Management Team (IMT) Closeout and Review

The park superintendent will conduct a closeout review with the IMT prior to their release from the fire incident. The purpose of this review is to ensure complete transition of the incident management back to the unit and to evaluate the status of any incomplete fire business. RM 18, Chapter 13, Exhibit 1 contains a sample Close-Out Review with Incident Management Team.

3. Unit Level Review

The superintendent or his/her designated representative should conduct the unit level review. The superintendent will appoint other qualified persons, including the unit fire management officer (or an official who has designated fire program management responsibilities) to be a part of the review. The purpose of this review is to provide the superintendent with information to recognize commendable actions and to take needed corrective action(s). Costs associated with the review will be charged to the account assigned to the fire with the approval of the regional fire management officer. A copy of the complete report will be sent to the regional fire management officer, who will review it and, if appropriate, forward a copy to the Fire Management Program Center.

4. Regional Level Review

A regional level review may be conducted for any fire that:

a. Crosses a park's boundary into another jurisdiction without the approval of an interagency agreement.

b. Results in adverse media attention.

c. Involves serious injury to less than 3 personnel, significant property damage, or an incident with potential.

d. Results in controversy involving another agency.

The regional level review normally will be conducted at the unit where the fire occurred. The regional fire management officer or his/her designated representative will convene the review. Attendees will include the superintendent of the unit, unit fire management officer (or the official who has designated fire program management responsibilities), the incident commander(s) for the fire, and other individuals agreed upon by the regional

director and superintendent. If possible, the review team should visit the actual fire site as part of the review. A copy of the review report will be sent to the Fire Management Program Center. Costs associated with the review will be charged to the account assigned to the fire.

5. National Level Review

A national level review may be conducted for any fire that involves Service wide or national issues, including:

a. Significant adverse media or political interest.

b. Multi-regional resource response.

c. A substantial loss of equipment or property.

d. A fatality, or multiple, serious fire-related injuries (three or more personnel).

e. Any other fires that the Associate Director, Park Operations and Education, wants reviewed.

The national level review normally will be conducted at the unit where the fire occurred. The National Fire Management Officer or his/her designated representative will convene it. It will be attended by the superintendent of the unit, the unit's fire management officer (or an official who has designated fire program management responsibilities), the regional fire management officer, the incident commander(s) for the fire, and other individuals agreed upon by the National Fire Management Officer, the regional director and the superintendent. If possible, the review team should visit the actual site of the fire as part of the review. All costs associated with the review will be charged to the account assigned to the fire.

An outline for final reports of fire reviews may be found in RM 18, Chapter 12, Exhibit 2. Exhibit 3 provides a checklist of sample questions, which might be asked during a fire review. These two documents should be used for unit, regional and national level reviews.

6. Entrapment and Fire Shelter Deployment Review

Fire shelter deployment is defined as the use of a fire shelter for its intended purpose in any situation other than training. Use of the terms "precautionary deployment", "practice deployment" and "entrapment deployment" are not acceptable or recognized. Entrapments and fire shelter deployments will be reviewed in order to gather complete and accurate information to determine the reasons for the deployment. Corrective recommendations will be developed to minimize future situations which might lead to other shelter deployments. All entrapments and fire shelter deployments will be reported to the regional fire management officer, who will be responsible for developing the review team in cooperation with the Fire Management Program Center. The team leader will contact the superintendent for reporting information. See RM 18, Chapter 3 for investigation and reporting requirements.

All entrapments and fire shelter deployments will be investigated as soon as possible after the deployment incident. RM 18, Chapter 13, Exhibit 4 provides specific directions for conducting an entrapment or shelter deployment review. RM 18, Chapter 13, Exhibit

5 provides an outline format for final reports on entrapment and fire shelter deployment reviews.

C. PROGRAM REVIEWS

1. Operations Evaluations

Operations evaluations of NPS units and regions may include review of fire management programs to assure compliance with established Service standards.

2. Annual Fire Program Review

The superintendent will convene an ad-hoc team to review park fire activity during any year in which significant, unusual or controversial fire activity occurs. This review team should analyze the reports from any reviews to determine what, if any, operational changes should be initiated. The review team will develop findings and recommendations and establish priorities for action.

3. FIREPRO Review

Annually, the FMO will conduct a FIREPRO audit and review of the park values at risk, research, equipment and project needs. This review will be completed on the schedule set by the Fire Management Program Center.

4. Fire Readiness Review

Fire readiness or preparedness reviews, utilizing the Interagency Fire Readiness Review Guide as adapted for park-specific needs, should be conducted annually prior to the established fire season by park fire management staff.

XIII. CONSULTATION AND COORDINATION

The following individuals and groups were consulted during the preparation of this plan.

Rachel Shaw, Project Manager, Mangi Environmental Group
Rebecca Whitney, Geographic Information Systems (GIS) Analyst, Mangi Environmental Group
Bonnie Bagelsberger, Missouri Department of Conservation
Marvin Kaye, Archeologist, University of Arkansas
Connie Langum, Wilson's Creek National Battlefield
Richard P. Lusardi, previous Superintendent, Wilson's Creek National Battlefield
Rob Klein, previous Fire Ecologist, Ozark National Scenic Riverways
Robert Randall, Wilson's Creek National Battlefield
Amy Salveter, U.S. Fish and Wildlife Service
Angela Smith, Ozark National Scenic Riverways
Gary Sullivan, Wilson's Creek National Battlefield
John Sutton, Wilson's Creek National Battlefield
Lisa Thomas, previous LTEM coordinator, Wilson's Creek National Battlefield
Paul Vitzthum, Southwest Regional Office, Missouri Department of Natural Resources

The environmental assessment was made available to the public via a press release mailed to over 100 local newspapers, TV and radio stations, local agencies, and interested members of the public. The public comment period was closed on December 22, 2004.

Several American Indian tribes have demonstrated interest in the areas within Wilson's Creek National Battlefield. A summary of the environmental assessment were sent to the Osage, Delaware, and Cherokee Nations. The Osage Nation responded by letter on December 15, 2004. The tribe determined that the site could have religious or cultural significance to the Osage Tribe and if construction activities should expose Osage archeological materials, such as bone, pottery, chipped stone, etc, we ask that construction activities cease, and there office be contacted so that an evaluation can be made. The Delaware Nation responded by letter on December 14th, 2004. The Delaware Nation is particularly concerned with archeological sites that may contain human burial remains and associated funerary objects. They agreed that the the action does not appear to endanger archeological sites but deferred to the state archeologist and SHPO regarding the need for archaeological surveys or further investigation. Should archeological surveys be required the tribe would like copies of the surveys, site forms and reports.

The Missouri State Historic Preservation Officer (SHPO) received a copy of the FMP sent by Federal Express on November 27, 2004. The letter accompanying this copy requested consultation. Follow up phone calls were made on November 22nd and a second copy was sent and arrived via Federal Express on December 27th. December 29, 2004 the SHPO sent a letter and concurred that the identification and protection strategies and mitigation measures for archaeological and historic architectural properties and the cultural landscape within Wilson's Creek National Battlefield, a property listed in the National Register of Historic Places, are adequate and acceptable for fire management purposes. They also stated that should project plans change, information documenting the revisions should be submitted to this office for further review. In the event that cultural materials are encountered during project activities, all construction should be halted, and this office notified as soon as possible in order to determine the appropriate course of action.

The U.S. Fish and Wildlife Service was consulted informally regarding this project, and agreed with the preserve's finding of no effect on threatened and endangered species. A copy of the

environmental assessment was sent to the Service on November 24, 2004. The FWS concurred with the finding of no affect in a response letter dated December 22, 2004.

The following federal agencies, state agencies received copies of the environmental assessment for review and comment. Native American Tribes received a summary of the action.

Federal Agencies and Government
U.S. Fish and Wildlife Service, Columbia, MO

American Indian Tribes
Cherokee Nation, Anadarko, Oklahoma
Delaware Nation, Anadarko, Oklahoma
Osage Tribe, Pawhuska, Oklahoma

State and Local Agencies and Governments
Missouri State Historic Preservation Office

Wilson's Creek National Battlefield Foundation

XIV. APPENDICES

APPENDIX A

A. REFERENCES CITED

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APPENDIX B

B. DEFINITIONS

A consistent list of terms and their definitions has been developed and approved by the NWCG. This list of defined terms includes terms obsolete under the new policy. Additional terms used in this reference guide but not defined by NWCG are from the Fire Effects Information System and other sources. The sources may be found in the References Cited (Appendix A).

Appropriate Management Response – Specific actions taken in response to a wildland fire to implement protection and fire use objectives. This term is a new term that does not replace any previously used term.

Backfire – A fire set along the inner edge of a fireline to consume the fuel in the path of a fire or to change the fire's convection column.

BI – Burning Index. A number related to the contribution that fire behavior makes to the amount or effort needed to contain a fire in a particular fuel type within a rating area. An Index for describing Fire Danger.

Climax – A biotic community that is in equilibrium with existing environmental conditions and represents the terminal stage of an ecological succession (Smith 2000).

Cover – The proportion of ground covered by the aerial parts of individuals of a species, usually expressed as a percentage (Grieg-Smith 1983). Total cover for all species on a site can exceed 100%. However, TOP-COVER, the proportion of ground for which a species provides the uppermost cover, cannot exceed 100% (Grieg-Smith 1983). Mueller-Dombois and Ellenberg (1974) consider basal area a special kind of "cover," but FEIS does not usually use COVER in this way.

Crown Fire – Fire that burns in the crowns of trees and shrubs. Usually ignited by a surface fire. Crown fires are common in coniferous forests and chaparral-type shrublands (Brown 2000).

Direct Effects of Fire – Described in FEIS plant species summaries under FIRE EFFECTS; IMMEDIATE FIRE EFFECT ON PLANT and DISCUSSION AND QUALIFICATION OF PLANT RESPONSE.

Duff – Partially decomposed organic matter lying beneath the litter layer and above the mineral soil. Includes the fermentation and humus layers of the forest floor (02 soil horizon) (Brown 2000).

Ecosystem – An interacting system of interdependent organisms.

Expected Weather Conditions – Those weather conditions indicated as common, likely, or highly probable based on current and expected trends and their comparison to historical weather records. They are the most probable weather conditions for this location and time. These conditions are used in making fire behavior forecasts for different scenarios (one necessary scenario involves fire behavior prediction under "expected weather conditions).

Fire Duration – The length of time that combustion occurs at a given point. Fire duration relates closely to downward heating and fire effects below the fuel surface as well as heating of tree boles above the surface.

Fire Exclusion – The policy of suppressing all wildland fires in an area (Smith 2000).

Fire Frequency = Fire Occurrence – Number of fires per unit time in a specified area (McPherson and others 1990).

Fire Interval – Time (in years) between two successive fires in a designated area (i.e., the interval between two successive fire occurrences); the size of the area must be clearly specified (McPherson and others 1990).

Fire Management Plan (FMP) – A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire Management Unit (FMU) – Any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regimes, etc., that sets it apart from management characteristics of an adjacent unit. FMU's are delineated in Fire Management Plans (FMP). These units may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

Fire Regime – Describes the patterns of fire occurrence, size, and severity - and sometimes, vegetation and fire effects as well - in a given area or ecosystem (Agee 1994, Mutch 1992, Johnson and Van Wagner 1985). A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories usually get repeated, and the repetitions can be counted and measured. The fire regime on a particular kind of site or in a particular ecosystem is not cyclic in a deterministic sense; it is, rather, a story about climate, human use, other disturbance, and species dispersion as they have all changed and interacted to affect an ecosystem, both suddenly and subtly, over millennia. The concept of fire regime as story lets us think about the future in that type or ecosystem as a question, perhaps a choice, rather than a destiny. According to Agee (1994), "A fire regime is a generalized way of integrating various fire characteristics. The organization may be according to the characteristics of the disturbance..., dominant or potential (climax) vegetation on the site..., or fire severity, the magnitude of effects on dominant vegetation...." According to Mutch (1992), "A natural fire regime is the total pattern of fires over time that is characteristic of a natural region or ecosystem. The classification of fire regimes includes variations in ignition, fire intensity and behavior, typical fire size, fire return intervals, and ecological effects." According to Johnson and Van Wagner (1985), "... fire regime is a multivariate system characterized by (i) the fire history measured in fire frequency or fire return period, (ii) fire intensity measured in kW/m, and (iii) depth of burn (duff removed) measured in kg/m, or percent...."

Fire-Resistant Species – Species with morphological characteristics that give it a lower probability of being injured or killed by fire than a FIRE-SENSITIVE species, which has a "relatively high" probability of being injured or killed by fire (McPherson and others 1990). Implies that the organism does not get injured by things that would seem able to

injure it (Johnson and Van Wagner 1985). (Rowe (1983) uses a more restrictive definition of resistance - relating it only to plants with aboveground parts that survive fire.)

Fire Severity – Degree to which a site has been altered or disrupted by fire; also used to describe the product of fire intensity and residence time (McPherson and others 1990, Agee 1994, Rowe 1983).

Fire Use – The combination of wildland fire use and prescribed fire application to meet resource objectives

Fireline Intensity – The rate of heat release per unit time per unit length of fire front. Numerically, the product of the heat of combustion, quantity of fuel consumed per unit area in the fire front, and the rate of spread of a fire, expressed in kW/m (McPherson and others 1990).

Flame Length – The length of flames in a fire front measured along the slant of the flame, from the midpoint of its base to its tip. Flame length is mathematically related to fireline intensity and tree crown scorch height (Brown 2000).

FMO – Fire Management Officer.

Fuel – Fuel is comprised of living and dead vegetation that can be ignited. It is often classified as dead or alive and as natural fuels or activity fuels (resulting from human actions, usually from logging operations). Fuel components refer to such items as downed dead woody material by various size classes, litter, duff, herbaceous vegetation, live foliage etc. (Brown 2000).

Fuel Continuity – A qualitative description of the distribution of fuel both horizontally and vertically. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread (Brown 2000).

Fuel Loading – The weight per unit area of fuel, often expressed in tons per acre or tons per hectare. Dead woody fuel loadings are commonly described for small material in diameter classes of 0 to 1/4-, 1/4 to 1-, and 1 to 3-inches and for large material in one class greater than 3 inches (Brown 2000).

Fuel Moisture – percent or fraction of oven dry weight of fuel. It is the most important fuel property controlling flammability. In living plants it is physiologically bound. Its daily fluctuations vary considerably by species but are usually above 80 to 100%. As plants mature, moisture content decreases. When herbaceous plants cure, their moisture content responds as dead fuel moisture content, which fluctuates according to changes in temperature, humidity, and precipitation (Brown 2000).

FWS – U.S. Fish and Wildlife Service, Department of the Interior.

GIS – Geographic Information System

GMP – General Management Plan. A park document that describes broad management goals and objectives for NPS units.

GPS – Geographic Positioning System

Ground Fire – Fire that burns in the organic material below the litter layer, mostly by smoldering combustion. Fires in duff, peat, dead moss and lichens, and punky wood are typically ground fires (Brown 2000).

Hazard Fuel – A fuel complex that, by nature, presents a hazard to socio-politico-economic interests when ignited. The hazard fuel condition can be mitigated through hazard fuel reduction.

Hazardous fuels – Those vegetative fuels which, when ignited, threaten: public safety, structures and facilities, cultural resources, natural resources, and/or natural processes. Also: fuels that permit the spread of wildland fires across administrative boundaries except as authorized by agreement, and fuel accumulations and arrangement may be within the natural range of variability and still be hazardous because of the proximity to values at risk.

Headfire – A fire spreading or set to spread with the wind (National Wildfire Coordinating Group 1995).

ICMR – Incident Commander Multiple Resources

ICSR – Incident Commander Single Resource.

Initial Attack – The first aggressive suppression action taken on a fire, consistent with firefighter and public safety, and values to be protected.

Initial Attack Incident Commander – Leader of first response fire suppression forces.

Ladder Fuels – Shrubs and young trees that provide continuous fine material from the forest floor into the crowns of dominant trees (Smith 2000).

Litter – The top layer of the forest floor (01 soil horizon); includes freshly fallen leaves, needles, fine twigs, bark flakes, fruits, matted dead grass and other vegetative parts that are little altered by decomposition. Litter also accumulates beneath rangeland shrubs. Some surface feather moss and lichens are considered to be litter because their moisture response is similar to that of dead fine fuel.

Long-Term Effects – Effects lasting more than 10 years. (Personal communication (Oct. 21, 1998) with Wendell Hann, Fire Ecologist and assistant to National Fuels Specialist, U.S. Department of Agriculture, Forest Service).

Mean Fire Interval – Arithmetic average of all FIRE INTERVALs determined, in years, for a designated area during a specified time period; the size of the area and the time period must be specified.

Mitigation Actions – Mitigation actions are considered to be those on-the-ground activities that serve to check, direct, or delay the spread of fire; and minimize threats to life, property, and resources. Actions may include mechanical and physical non-fire tasks, specific fire applications, and limited suppression actions. These actions will be used to construct firelines, reduce excesssive fuel concentrations, reduce vertical fuel continuity,

create fuel breaks or barriers around critical or sensitive sites or resources, create "blacklines" through controlled burnouts, and to limit fire spread and behavior.

Mixed-Severity Fire Regime – Fire regime in which fires either cause selective mortality in dominant vegetation, depending on different species' susceptibility to fire, or vary between understory and stand replacement (Smith 2000).

MOA – Memorandum of Agreement

MOU – Memorandum of Understanding.

National Fire Danger Rating System (NFDRS) – A widely used system to predict several measures of fire probability and resistance to control.

Natural Fire – Fires ignited by natural means (usually lighting).

NFFL Model – One of the thirteen fuel models used to predict fire behavior using the fire spread formulas developed by Rothermel (1972).

NPS – National Park Service, Department of the Interior.

Organic Soils – Deep layers of organic matter that develop in poorly drained areas such as bogs, swamps, and marshes (Brown 2000).

Preparedness – Activities that lead to a safe, efficient and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces presuppression.

Prescribed Fire – Any fire ignited by management actions to meet specific objectives. Prior to ignition, a written, approved prescribed fire plan must exist, and National Environmental Protection Act requirements must be met. This term replaces management ignited prescribed fire.

Presettlement Fire Regime – The time from about 1500 to the mid- to late-1800s, a period when Native American populations had already been heavily impacted by European presence and before extensive settlement by European Americans in most parts of North America, before extensive conversion of wildlands for agricultural and other purposes, and before fires were effectively suppressed in many areas (Smith 2000).

Prescribed Fire Plan – A plan required for each fire application ignited by managers. It must be prepared by qualified personnel and approved by the appropriate Agency Administrator prior to implementation. Each plan will follow specific agency direction and must include critical elements described in agency manuals. Formats for plan development vary among agencies, although the content is identical.

Prescribed Fire Specialist – The staff specialist with primary duties of managing both the prescribed fire and Wildland Fire Used for Resource Benefit (where applicable) programs.

Prescription – Measurable criteria which define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other

required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social or legal considerations.

Relict – A biotic community or fragment of a community that has survived some important change, often to become in appearance an integral part of existing vegetation

Resource Management Plan (RMP) – Park planning document that describes resource management goals and objectives for NPS units.

Sere – A succession of plant communities leading to a particular plant association (Smith 2000).

Short-Term Effects – Effects lasting less than 10 years (Personal communication (Oct. 21, 1998) with Wendell Hann, Fire Ecologist and assistant to National Fuels Specialist, U.S. Department of Agriculture, Forest Service).

Snag – A standing dead tree from which the leaves and some of the branches have fallen (Smith 2000).

Stand-Replacement Fire Regime – Fire regime in which fires kill or top-kill aboveground parts of the dominant vegetation, changing the aboveground structure substantially. Approximately 80 percent or more of the aboveground, dominant vegetation is either consumed or dies as a result of fires. Applies to forests, shrublands, and grasslands (Smith 2000).

Succession – The gradual, somewhat predictable process of community change and replacement leading toward a climax community; the process of continuous colonization and extinction of populations at a particular site (Smith 2000).

Suppression – see Wildland Fire Suppression

Surface Fire – Fire that burns in litter and other live and dead fuels at or near the surface of the ground, mostly by flaming combustion (Brown 2000).

T&E – Threatened and Endangered plants and animals. Also referred to as listed species.

Top-Kill – Kills aboveground tissues of plant without killing underground parts from which the plant can produce new stems and leaves (Smith 2000).

Total Heat Release – The heat released by combustion during burnout of all fuels, expressed in BTU per square foot or kilocalories per square meter (Brown 2000).

Underburn – Understory fire.

Understory Fire Regime – Fire regime in which fires are generally not lethal to the dominant vegetation and do not substantially change the structure of the dominant vegetation. Approximately 80 percent or more of the aboveground dominant vegetation survives fires. Applies to forest and woodland vegetation types (Smith 2000).

Urban Interface – See Wildland-Urban Interface.

Urban Intermix – Locating structures (homes, offices, and other developments) in wildland fuel complexes. Also known as wildland-urban interface.

USFS – United States Forest Service

Wildfire – An unwanted wildland fire. *This term was only included to give continuing credence to the historic fire prevention products. This is NOT a separate type of fire.*

Wildland Fire – Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildland Fire Management Program – The full range of activities and functions necessary for planning, preparedness, emergency suppression operations, and emergency rehabilitation of wildland fires, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health.

Wildland Fire Situation Analysis (WFSA) – The decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives.

Wildland Fire Suppression – An appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources.

Wildland Fire Use – The management of naturally-ignited wildland fires to accomplish specific, pre-stated, resource management objectives in pre-defined geographic areas outlined in Fire Management Plans. Operational management is described in the Wildland Fire Implementation Plan (WFIP). Wildland fire use is not to be confused with "fire use," a broader term encompassing more than just wildland fires.

Wildland-Urban Interface – Locating structures (homes, offices, and other developments) in wildland fuel complexes. Also known as urban interface.

APPENDIX C

C. SPECIES LIST

The following species lists are derived from the Inventory and Monitoring Program. There are five lists, Birds, Mammals, Reptiles, Non-Native Plants and Native Plants. Additional details are available in the I&M database kept at the Battlefield.

Birds

Common Name	Accepted Scientific Name
Acadian Flycatcher	*Empidonax virescens*
American Crow	*Corvus brachyrhynchos*
American Goldfinch	*Carduelis tristis*
American Kestrel	*Falco sparverius*
American Redstart	*Setophaga ruticilla*
American Robin	*Turdus migratorius*
American Tree Sparrow	*Spizella arborea*
American Woodcock	*Scolopax minor*
Barn Swallow	*Hirundo rustica*
Barred Owl	*Strix varia*
Bell's Vireo	*Vireo bellii*
Belted Kingfisher	*Ceryle alcyon*
Bewick's Wren	*Thryomanes bewickii*
Black-And-White Warbler	*Mniotilta varia*
Black-Billed Cuckoo	*Coccyzus erythropthalmus*
Black-Crowned Night-Heron	*Nycticorax nycticorax*
Blue Grosbeak	*Guiraca caerulea*
Blue Jay	*Cyanocitta cristata*
Blue-Gray Gnatcatcher	*Polioptila caerulea*
Blue-Winged Warbler	*Vermivora pinus*
Broad-Winged Hawk	*Buteo platypterus*
Brown Creeper	*Certhia americana*
Brown Thrasher	*Toxostoma rufum*
Brown-Headed Cowbird	*Molothrus ater*
Canada Goose	*Branta canadensis*
Carolina Chickadee	*Parus carolinensis*
Carolina Wren	*Thryothorus ludovicianus*
Cedar Waxwing	*Bombycilla cedrorum*
Chimney Swift	*Chaetura pelagica*
Chipping Sparrow	*Spizella passerina*
Common Grackle	*Quiscalus quiscula*
Common Nighthawk	*Chordeiles minor*
Common Snipe	*Gallinago gallinago*
Common Yellowthroat	*Geothlypis trichas*
Cooper's Hawk	*Accipiter cooperii*
Dark-Eyed Junco	*Junco hyemalis*
Dickcissel	*Spiza americana*
Downy Woodpecker	*Picoides pubescens*
Eastern Bluebird	*Sialia sialis*
Eastern Kingbird	*Tyrannus tyrannus*
Eastern Meadowlark	*Sturnella magna*
Eastern Phoebe	*Sayornis phoebe*
Eastern Screech-Owl	*Otus asio*
Eastern Wood-Pewee	*Contopus virens*
European Starling	*Sturnus vulgaris*
Field Sparrow	*Spizella pusilla*
Fox Sparrow	*Passerella iliaca*
Gadwall	*Anas strepera*
Grasshopper Sparrow	*Ammodramus savannarum*
Gray Catbird	*Dumetella carolinensis*
Gray-Cheeked Thrush	*Catharus minimus*
Great Blue Heron	*Ardea herodias*
Great Crested Flycatcher	*Myiarchus crinitus*
Great Horned Owl	*Bubo virginianus*
Green-Backed Heron	*Butorides striatus*
Green-Winged Teal	*Anas crecca*
Hairy Woodpecker	*Picoides villosus*

Common Name	Accepted Scientific Name
Harris' Sparrow	*Zonotrichia querula*
Horned Lark	*Eremophila alpestris*
House Sparrow	*Passer domesticus*
House Wren	*Troglodytes aedon*
Indigo Bunting	*Passerina cyanea*
Kentucky Warbler	*Oporornis formosus*
Killdeer	*Charadrius vociferus*
Lark Sparrow	*Chondestes grammacus*
Least Flycatcher	*Empidonax minimus*
Lincoln's Sparrow	*Melospiza lincolnii*
Loggerhead Shrike	*Lanius ludovicianus*
Louisiana Waterthrush	*Seiurus motacilla*
Mallard	*Anas platyrhynchos*
Merlin	*Falco columbarius*
Mourning Dove	*Zenaida macroura*
Nashville Warbler	*Vermivora ruficapilla*
Northern Bobwhite	*Colinus virginianus*
Northern Cardinal	*Cardinalis cardinalis*
Northern Flicker	*Colaptes auratus*
Northern Harrier	*Circus cyaneus*
Northern Mockingbird	*Mimus polyglottos*
Northern Oriole	*Icterus galbula*
Northern Parula	*Parula americana*
Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*
Northern Shoveler	*Anas clypeata*
Northern Waterthrush	*Seiurus noveboracensis*
Olive-Sided Flycatcher	*Contopus borealis*
Orchard Oriole	*Icterus spurius*
Peregrine Falcon	*Falco peregrinus*
Philadelphia Vireo	*Vireo philadelphicus*
Pileated Woodpecker	*Dryocopus pileatus*
Prairie Falcon	*Falco mexicanus*
Prothonotary Warbler	*Protonotaria citrea*
Purple Finch	*Carpodacus purpureus*
Purple Martin	*Progne subis*
Red-Bellied Woodpecker	*Melanerpes carolinus*
Red-Breasted Nuthatch	*Sitta canadensis*
Red-Eyed Vireo	*Vireo olivaceus*
Red-Headed Woodpecker	*Melanerpes erythrocephalus*
Red-Tailed Hawk	*Buteo jamaicensis*
Red-Winged Blackbird	*Agelaius phoeniceus*
Rock Dove	*Columba livia*
Rose-Breasted Grosbeak	*Pheucticus ludovicianus*
Ruby-Crowned Kinglet	*Regulus calendula*
Ruby-Throated Hummingbird	*Archilochus colubris*
Rufous-Sided Towhee	*Pipilo erythrophthalmus*
Savannah Sparrow	*Passerculus sandwichensis*
Scissor-Tailed Flycatcher	*Tyrannus forficatus*
Sharp-Shinned Hawk	*Accipiter striatus*
Snow Goose	*Chen caerulescens*
Solitary Vireo	*Vireo solitarius*
Song Sparrow	*Melospiza melodia*
Summer Tanager	*Piranga rubra*
Swainson's Hawk	*Buteo swainsoni*
Swainson's Thrush	*Catharus ustulatus*
Swamp Sparrow	*Melospiza georgiana*
Tufted Titmouse	*Parus bicolor*
Turkey Vulture	*Cathartes aura*
Vesper Sparrow	*Pooecetes gramineus*
Warbling Vireo	*Vireo gilvus*
Whip-Poor-Will	*Caprimulgus vociferus*
White-Breasted Nuthatch	*Sitta carolinensis*
White-Crowned Sparrow	*Zonotrichia leucophrys*
White-Eyed Vireo	*Vireo griseus*
White-Throated Sparrow	*Zonotrichia albicollis*
Willow Flycatcher	*Empidonax traillii*
Wilson's Warbler	*Wilsonia pusilla*
Winter Wren	*Troglodytes troglodytes*
Wood Duck	*Aix sponsa*

Common Name	Accepted Scientific Name
Yellow Warbler	*Dendroica petechia*
Yellow-Bellied Flycatcher	*Empidonax flaviventris*
Yellow-Bellied Sapsucker	*Sphyrapicus varius*
Yellow-Billed Cuckoo	*Coccyzus americanus*
Yellow-Breasted Chat	*Icteria virens*
Yellow-Rumped Warbler	*Dendroica coronata*
Yellow-Throated Vireo	*Vireo flavifrons*
Yellow-Throated Warbler	*Dendroica dominica*

Mammals

Common Name	Accepted Scientific Name
Deer Mouse	*Peromyscus maniculatus*
Hispid Cotton Rat	*Sigmodon hispidus*
Least Shrew	*Cryptotis parva*
Prairie Vole	*Microtus ochrogaster*
Western Harvest Mouse	*Reithrodontomys megalotis*
White-Footed Mouse	*Peromyscus leucopus*

Plants

Common Name	Accepted Scientific Name
Alfalfa	*Medicago sativa*
American Bellflower	*Campanula americana*
American Bittersweet	*Celastrus scandens*
American Elder	*Sambucus canadensis*
American Elm	*Ulmus americana*
American Hazelnut	*Corylus americana*
American Hazelnut	*Corylus americana var. indehiscens*
American Hogpeanut	*Amphicarpaea bracteata*
American Lopseed	*Phryma leptostachya*
American Plum	*Prunus americana*
American Pokeweed	*Phytolacca americana*
American Sycamore	*Platanus occidentalis*
Annual Bluegrass	*Poa annua*
Annual Ragweed	*Ambrosia artemisiifolia*
Arctic Brome	*Bromus purgans*
Arkansas Bedstraw	*Galium arkansanum*
Arkansas Ironweed	*Vernonia arkansana*
Asiatic Dayflower	*Commelina communis*
Atlantic Camas	*Camassia scilloides*
Bald Brome	*Bromus racemosus*
Balwin's Ironweed	*Vernonia baldwinii*
Bastard Toadflax	*Comandra umbellata*
Beaked Cornsalad	*Valerianella radiata*
Beefsteakplant	*Perilla frutescens*
Benjamin Franklin Bush	*Valerianella ozarkana*
Betonyleaf Noseburn	*Tragia betonicifolia*
Big Bluestem	*Andropogon gerardii*
Big Chickweed	*Cerastium vulgatum*
Bitter Dock	*Rumex obtusifolius*
Bitternut Hickory	*Carya cordiformis*
Black Cherry	*Prunus serotina*
Black Hickory	*Carya texana*
Black Medick	*Medicago lupulina*
Black Oak	*Quercus velutina*
Black Raspberry	*Rubus occidentalis*
Black Walnut	*Juglans nigra*
Black Willow	*Salix nigra*
Blackeyed Susan	*Rudbeckia hirta*
Blackeyed Susan	*Rudbeckia hirta var. pulcherrima*
Blackhaw	*Viburnum prunifolium*
Blackjack Oak	*Quercus marilandica*
Blackseed Plantain	*Plantago rugelii*
Bloodroot	*Sanguinaria canadensis*
Blue Ash	*Fraxinus quadrangulata*
Blue Fieldmadder	*Sherardia arvensis*

Common Name	Accepted Scientific Name
Blue Grama	*Bouteloua gracilis*
Blue Ridge Carrionflower	*Smilax lasioneura*
Blue Waxweed	*Cuphea viscosissima*
Bluebill	*Clematis pitcheri*
Bluejacket	*Tradescantia ohiensis*
Bluntlobe Cliff Fern	*Woodsia obtusa*
Bouncingbet	*Saponaria officinalis*
Boxelder	*Acer negundo*
Bristlegrass	*Setaria glauca*
Bristly Buttercup	*Ranunculus septentrionalis*
Bristly Greenbrier	*Smilax hispida*
Bristly Locust	*Robinia hispida*
Browneyed Susan	*Rudbeckia triloba*
Buffalograss	*Buchloe dactyloides*
Bur Oak	*Quercus macrocarpa*
Bush's Oak	*Quercus X bushii*
Bush's Sedge	*Carex bushii*
Butterfly Milkweed	*Asclepias tuberosa ssp. interior*
Canada Bluegrass	*Poa compressa*
Canada Goldenrod	*Solidago altissima*
Canada Lettuce	*Lactuca canadensis var. latifolia*
Canadian Blacksnakeroot	*Sanicula canadensis*
Canadian Clearweed	*Pilea pumila*
Canadian Horseweed	*Conyza canadensis*
Canadian Woodnettle	*Laportea canadensis*
Candad Germander	*Teucrium canadense*
Carolina Coralbead	*Cocculus carolinus*
Carolina Elephantsfoot	*Elephantopus carolinianus*
Carolina Geranium	*Geranium carolinianum*
Carolina Geranium	*Geranium sphaerospermum*
Carolina Horsenettle	*Solanum carolinense*
Carolina Larkspur	*Delphinium carolinianum*
Carolina Rose	*Rosa carolina*
Carolina Whitlowgrass	*Draba reptans*
Carpenter's Square	*Scrophularia marilandica*
Catnip	*Nepeta cataria*
Chapman's Bluegrass	*Poa chapmaniana*
Cheatgrass	*Bromus tectorum*
Chickasaw Plum	*Prunus angustifolia*
Chickenthief	*Mentzelia oligosperma*
Chicory	*Cichorium intybus*
Chinese Lespedeza	*Lespedeza cuneata*
Chinkapin Oak	*Quercus muehlenbergii*
Clammy Groundcherry	*Physalis heterophylla var. ambigua*
Clasping Venus' Lookingglass	*Triodanis perfoliata*
Claspleaf Pennycress	*Thlaspi perfoliatum*
Climbing False Buckwheat	*Polygonum scandens*
Climbing False Buckwheat	*Polygonum scandens var. cristatum*
Climbing Rose	*Rosa setigera*
Climbing Rose	*Rosa setigera var. tomentosa*
Cockspur Hawthorn	*Crataegus crus-galli*
Common Blue Violet	*Viola papilionacea*
Common Blue Violet	*Viola sororia*
Common Chickweed	*Stellaria media*
Common Cinquefoil	*Potentilla simplex*
Common Daffodil	*Narcissus pseudonarcissus*
Common Dandelion	*Taraxacum officinale*
Common Eveningprimrose	*Oenothera biennis*
Common Hackberry	*Celtis occidentalis*
Common Hoptree	*Ptelea trifoliata*
Common Lilac	*Syringa vulgaris*
Common Mallow	*Malva neglecta*
Common Milkweed	*Asclepias syriaca var. kansana*
Common Motherwort	*Leonurus cardiaca*
Common Mullein	*Verbascum thapsus*
Common Pawpaw	*Asimina triloba*
Common Persimmon	*Diospyros virginiana*
Common Pricklyash	*Zanthoxylum americanum*
Common Selfheal	*Prunella vulgaris*

Common Name	Accepted Scientific Name
Common Serviceberry	*Amelanchier arborea*
Common Sheep Sorrel	*Rumex acetosella*
Common St. Johnswort	*Hypericum perforatum*
Common Velvetgrass	*Holcus lanatus*
Common Wheat	*Triticum aestivum*
Common Yarrow	*Achillea millefolium*
Common Yellow Oxalis	*Oxalis stricta*
Coralberry	*Symphoricarpos orbiculatus*
Corn Gromwell	*Lithospermum arvense*
Corn Speedwell	*Veronica arvensis*
Creeping Bentgrass	*Agrostis stolonifera*
Creeping Woodsorrel	*Oxalis corniculata*
Crowpoison	*Allium bivalve*
Cultivated Garlic	*Allium sativum*
Cup Plant	*Silphium perfoliatum*
Cutleaf Coneflower	*Rudbeckia laciniata*
Cutleaf Toothwort	*Cardamine concatenata*
Cypress Panicgrass	*Dichanthelium dichotomum*
Dallasgrass	*Paspalum dilatatum*
Dames Rocket	*Hesperis matronalis*
Darnel Ryegrass	*Lolium temulentum*
Davis' Sedge	*Carex davisii*
Deertongue Panicgrass	*Dichanthelium clandestinum*
Deptford Pink	*Dianthus armeria*
Diamondflowers	*Houstonia nigricans*
Dillen's Oxalis	*Oxalis dillenii*
Disc Mayweed	*Matricaria matricarioides*
Dotted Hawthorn	*Crataegus punctata*
Dotted Smartweed	*Polygonum punctatum*
Dropseed	*Sporobolus asper*
Dwarf Groundcherry	*Physalis pumila*
Dwarf Hackberry	*Celtis tenuifolia*
Dwarf Hawthorn	*Crataegus uniflora*
Dwarf Larkspur	*Delphinium tricorne*
Dwarf Nettle	*Urtica urens*
Dwarf Sumac	*Rhus copallinum*
Dyersweed Goldenrod	*Solidago nemoralis*
Early Buttercup	*Ranunculus fascicularis*
Eastern Bottlebrush Grass	*Hystrix patula*
Eastern Daisy Fleabane	*Erigeron annuus*
Eastern Narrowleaf Sedge	*Carex amphibola*
Eastern Narrowleaf Sedge	*Carex amphibola var. turgida*
Eastern Poison Ivy	*Toxicodendron radicans*
Eastern Purple Coneflower	*Echinacea purpurea*
Eastern Redbud	*Cercis canadensis*
Eastern Redcedar	*Juniperus virginiana*
Eastern Wahoo	*Euonymus atropurpurea*
Eastern Woodland Sedge	*Carex blanda*
Ebony Spleenwort	*Asplenium platyneuron*
English Ivy	*Hedera helix*
Erect Hedgeparsley	*Torilis japonica*
European Chickweed	*Cerastium pumilum*
Fall Phlox	*Phlox paniculata*
Fall Witchgrass	*Leptoloma cognatum*
False Boneset	*Brickellia eupatorioides var. corymbulosa*
False Spotted St. Johnswort	*Hypericum pseudomaculatum*
Feverwort	*Triosteum perfoliatum*
Fewflower Ticktrefoil	*Desmodium pauciflorum*
Field Clover	*Trifolium campestre*
Field Pansy	*Viola bicolor*
Field Pepperweed	*Lepidium campestre*
Field Thistle	*Cirsium discolor*
Fireberry Hawthorn	*Crataegus chrysocarpa*
Flatstem Spikerush	*Eleocharis compressa*
Flowering Spurge	*Euphorbia corollata*
Fluxweed	*Trichostema brachiatum*
Fowl Bluegrass	*Poa palustris*
Fowl Mannagrass	*Glyceria striata*

Common Name	Accepted Scientific Name
Fox Sedge	*Carex vulpinoidea*
Fragrant Sumac	*Rhus aromatica*
Frank's Sedge	*Carex frankii*
Fringeleaf Wild Petunia	*Ruellia humilis*
Frost Grape	*Vitis vulpina*
Fuller's Teasel	*Dipsacus fullonum*
Fuller's Teasel	*Dipsacus sylvestris*
Fuzzy Scorpionweed	*Phacelia hirsuta*
Fuzzy Wuzzy Sedge	*Carex hirsutella*
Garden Cosmos	*Cosmos bipinnatus*
Garden Yellowrocket	*Barbarea vulgaris*
Giant Goldenrod	*Solidago gigantea*
Giant Goldenrod	*Solidago gigantea ssp. serotina*
Giant Ironweed	*Vernonia gigantea*
Glomerate Sedge	*Carex aggregata*
Golden Tickseed	*Coreopsis tinctoria*
Gravelweed	*Verbesina helianthoides*
Gray Dogwood	*Cornus foemina ssp. racemosa*
Graybark Grape	*Vitis cinerea*
Great Chickweed	*Stellaria pubera*
Great Ragweed	*Ambrosia trifida*
Green Antelopehorn	*Asclepias viridis*
Green Ash	*Fraxinus pennsylvanica*
Green Bristlegrass	*Setaria viridis*
Green Field Speedwell	*Veronica agrestis*
Gum Bumelia	*Bumelia lanuginosa*
Hairy Angelica	*Angelica venenosa*
Hairy Crabgrass	*Digitaria sanguinalis*
Hairy Goldenaster	*Heterotheca villosa*
Hairy Skullcap	*Scutellaria elliptica*
Hairy Smallleaf Ticktrefoil	*Desmodium ciliare*
Hairy Wildrye	*Elymus villosus*
Hairyfruit Chervil	*Chaerophyllum tainturieri*
Hairyseed Paspalum	*Paspalum pubiflorum var. glabrum*
Heartleaf Four O'clock	*Mirabilis nyctaginea*
Heartleaf Peppervine	*Ampelopsis cordata*
Heavy Sedge	*Carex gravida*
Hedge False Bindweed	*Calystegia sepium*
Hedge False Bindweed	*Calystegia sepium ssp. americana*
Hedgemustard	*Sisymbrium officinale*
Heller's Rosette Grass	*Dichanthelium oligosanthes*
Henbit Deadnettle	*Lamium amplexicaule*
Hispid False Mallow	*Malvastrum hispidum*
Honeylocust	*Gleditsia triacanthos*
Indian Goosegrass	*Eleusine indica*
Indianhemp	*Apocynum cannabinum*
Interior Ironweed	*Vernonia baldwinii ssp. interior*
Italian Ryegrass	*Lolium perenne ssp. multiflorum*
Ivyleaf Morningglory	*Ipomoea hederacea*
Ivyleaf Speedwell	*Veronica hederifolia*
James' Sedge	*Carex jamesii*
Japanese Bristlegrass	*Setaria faberi*
Japanese Brome	*Bromus japonicus*
Japanese Honeysuckle	*Lonicera japonica*
Japanese Hop	*Humulus japonicus*
Jerusalem Artichoke	*Helianthus tuberosus*
Jewelweed	*Impatiens capensis*
Jimsonweed	*Datura stramonium*
Johnsongrass	*Sorghum halepense*
Jointed Goatgrass	*Triticum cylindricum*
Jumpseed	*Polygonum virginianum*
Kentucky Bluegrass	*Poa pratensis*
King Solomon's Seal	*Polygonatum biflorum*
King Solomon's Seal	*Polygonatum commutatum*
Korean Clover	*Lespedeza stipulacea*
Lance Selfheal	*Prunella vulgaris ssp. lanceolata*
Lanceleaf Fogfruit	*Phyla lanceolata*
Largebracted Plantain	*Plantago aristata*
Largeflower Fameflower	*Talinum calycinum*

Common Name	Accepted Scientific Name
Largeleaf Wild Indigo	*Baptisia lactea*
Late Purple Aster	*Aster patens var. patentissimus*
Leadplant	*Amorpha canescens*
Leavenworth's Sedge	*Carex leavenworthii*
Lesser Burrdock	*Arctium minus*
Licorice Bedstraw	*Galium circaezans*
Light Poppymallow	*Callirhoe alcaeoides*
Limestone Adderstongue	*Ophioglossum engelmannii*
Limestone Calamint	*Satureja arkansana*
Limestone Meadow Sedge	*Carex granularis*
Limestone Wild Petunia	*Ruellia strepens*
Lindheimer Panicgrass	*Dichanthelium acuminatum var. lindheimeri*
Little Barley	*Hordeum pusillum*
Little Bluestem	*Schizachyrium scoparium*
Little Lovegrass	*Eragrostis minor*
Littlehip Hawthorn	*Crataegus spathulata*
Littleleaf Buttercup	*Ranunculus abortivus*
Longflower Beeblossom	*Gaura longiflora*
Longleaf Groundcherry	*Physalis longifolia*
Longleaf Groundcherry	*Physalis longifolia var. subglabrata*
Longleaf Summer Bluet	*Houstonia longifolia*
Longroot Smartweed	*Polygonum amphibium var. emersum*
Man Of The Earth	*Ipomoea pandurata*
Marshpepper Knotweed	*Polygonum hydropiper*
Maryland Wild Sensitive Plant	*Cassia marilandica*
Mayapple	*Podophyllum peltatum*
Meadow Fescue	*Festuca pratensis*
Meadow Garlic	*Allium canadense*
Meadow Garlic	*Allium canadense ssp. mobilense*
Midland Fawnlily	*Erythronium albidum var. mesochoreum*
Midland Sedge	*Carex mesochorea*
Missouri Bladderpod	*Lesquerella filiformis*
Missouri Gooseberry	*Ribes missouriense*
Missouri Ironweed	*Vernonia missurica*
Moth Mullein	*Verbascum blattaria*
Muhlenberg's Sedge	*Carex muehlenbergii*
Muhlenberg's Sedge	*Carex muehlenbergii var. australis*
Muhlenberg's Sedge	*Carex muehlenbergii var. enervis*
Multiflora Rose	*Rosa multiflora*
Narrowleaf Mountainmint	*Pycnanthemum tenuifolium*
Narrowleaf Plantain	*Plantago lanceolata*
Narrowleaf Vervain	*Verbena simplex*
Nettleleaf Noseburn	*Tragia urticifolia*
Nimblewill Muhly	*Muhlenbergia schreberi*
Nits And Lice	*Hypericum drummondii*
Nodding Fescue	*Festuca obtusa*
Nodding Plumeless Thistle	*Carduus nutans*
Northern Dewberry	*Rubus enslenii*
Northern Red Oak	*Quercus rubra*
Ohio Buckeye	*Aesculus glabra*
Oneseed Burr Cucumber	*Sicyos angulatus*
Orange Daylily	*Hemerocallis fulva*
Orchardgrass	*Dactylis glomerata*
Oriental Ladysthumb	*Polygonum cespitosum*
Osageorange	*Maclura pomifera*
Ovalleaf Sedge	*Carex cephalophora*
Owlfruit Sedge	*Carex stipata*
Oxeyedaisy	*Leucanthemum vulgare*
Ozark Bluestar	*Amsonia illustris*
Ozark Milkvetch	*Astragalus distortus*
Pale Beardtongue	*Penstemon pallidus*
Pale Dock	*Rumex altissimus*
Pale Purple Coneflower	*Echinacea pallida*
Pale Touchmenot	*Impatiens pallida*
Partridge Pea	*Cassia nictitans*
Pasture Heliotrope	*Heliotropium tenellum*
Pecan	*Carya illinoinensis*

Common Name	Accepted Scientific Name
Pennsylvania Smartweed	*Polygonum pensylvanicum*
Perennial Peavine	*Lathyrus latifolius*
Pinkladies	*Oenothera speciosa*
Pinnate Prairie Coneflower	*Ratibida pinnata*
Pitcher's Stitchwort	*Minuartia patula*
Poet's Narcissus	*Narcissus poeticus*
Poison Hemlock	*Conium maculatum*
Post Oak	*Quercus stellata*
Poverty Brome	*Bromus sterilis*
Prairie Crabapple	*Malus ioensis*
Prairie Fleabane	*Erigeron strigosus*
Prairie Groundcherry	*Physalis virginiana var. hispida*
Prairie Tea	*Croton monanthogynus*
Prairie Wedgescale	*Sphenopholis obtusata*
Prickly Fanpetals	*Sida spinosa*
Prickly Lettuce	*Lactuca serriola*
Pricklypear	*Opuntia humifusa*
Purple Cliffbrake	*Pellaea atropurpurea*
Purple Deadnettle	*Lamium purpureum*
Purple Granadilla	*Passiflora edulis*
Purple Lovegrass	*Eragrostis spectabilis*
Purple Milkweed	*Asclepias purpurascens*
Purple Prairieclover	*Dalea purpurea*
Purplehead Sneezeweed	*Helenium flexuosum*
Purplestem Beggarticks	*Bidens connata var. petiolata*
Purpletop Tridens	*Tridens flavus*
Quackgrass	*Agropyron repens*
Queen Anne's Lace	*Daucus carota*
Queendevil	*Hieracium gronovii*
Rabbit Tobacco	*Gnaphalium obtusifolium*
Rattail Fescue	*Vulpia myuros*
Rattlesnake Fern	*Botrychium virginianum*
Red Clover	*Trifolium pratense*
Red Fescue	*Festuca rubra*
Red Hickory	*Carya ovalis*
Red Mulberry	*Morus rubra*
Redtop	*Agrostis alba*
Reed Canarygrass	*Phalaris arundinacea*
Reflexed Sedge	*Carex retroflexa*
Richardson's Alumroot	*Heuchera richardsonii*
Richwoods Sedge	*Carex oligocarpa*
Riverbank Wildrye	*Elymus riparius*
Rock Buttercup	*Ranunculus micranthus*
Rock Muhly	*Muhlenbergia sobolifera*
Rose Mock Vervain	*Verbena canadensis*
Rosepink	*Sabatia angularis*
Rough Barnyardgrass	*Echinochloa muricata*
Roughleaf Dogwood	*Cornus drummondii*
Royal Catchfly	*Silene regia*
Rue Anemone	*Thalictrum thalictroides*
Rusty Blackhaw	*Viburnum rufidulum*
Rye Brome	*Bromus secalinus*
Sandbar Lovegrass	*Eragrostis frankii*
Sassafras	*Sassafras albidum*
Saw Greenbrier	*Smilax bona-nox*
Seneca Snakeroot	*Polygala senega*
Shagbark Hickory	*Carya ovata*
Shaggysoldier	*Galinsoga quadriradiata*
Sheep Fescue	*Festuca ovina*
Shepherd's Purse	*Capsella bursa-pastoris*
Shingle Oak	*Quercus imbricaria*
Shining Bedstraw	*Galium concinnum*
Short's Sedge	*Carex shortiana*
Shrubby St. Johnswort	*Hypericum prolificum*
Shumard's Oak	*Quercus shumardii*
Siberian Elm	*Ulmus pumila*
Sideoats Grama	*Bouteloua curtipendula*
Silver Maple	*Acer saccharinum*
Sixweeks Fescue	*Vulpia octoflora*

Common Name	Accepted Scientific Name
Sleepingplant	*Cassia fasciculata*
Sleepy Silene	*Silene antirrhina*
Sleepydick	*Ornithogalum umbellatum*
Slender Crabgrass	*Digitaria filiformis*
Slender Snakecotton	*Froelichia gracilis*
Slender Woodland Sedge	*Carex digitalis*
Slimflower Scurfpea	*Psoralea tenuiflora*
Slimleaf Panicum	*Dichanthelium linearifolium*
Slippery Elm	*Ulmus rubra*
Small Skullcap	*Scutellaria parvula*
Smallflower Sweetbrier	*Rosa micrantha*
Smallhead Aster	*Aster parviceps*
Smooth Brome	*Bromus inermis*
Smooth Crabgrass	*Digitaria ischaemum*
Smooth Oxeye	*Heliopsis helianthoides ssp. occidentalis*
Smooth Sumac	*Rhus glabra*
Soft Brome	*Bromus mollis*
Soft Fox Sedge	*Carex conjuncta*
Soft Goldenaster	*Heterotheca pilosa*
Softleaf Blackberry	*Rubus mollior*
Softleaf Rosette Grass	*Dichanthelium malacophyllum*
Southern Red Oak	*Quercus falcata*
Southwestern Bedstraw	*Galium virgatum*
Spotted Sandmat	*Euphorbia maculata*
Spreading Chervil	*Chaerophyllum procumbens*
Spreading Hawthorn	*Crataegus disperma*
Spreading Hedgeparsley	*Torilis arvensis*
Spring Avens	*Geum vernum*
Starved Panicgrass	*Dichanthelium depauperatum*
Stickywilly	*Galium aparine*
Stiff Greenthread	*Thelesperma filifolium*
Stiff Ticktrefoil	*Desmodium rigidum*
Stinkgrass	*Eragrostis cilianensis*
Suckling Clover	*Trifolium dubium*
Sugar Maple	*Acer saccharum*
Sulphur Cinquefoil	*Potentilla recta*
Summer Grape	*Vitis aestivalis*
Swamp Milkweed	*Asclepias incarnata*
Swamp Smartweed	*Polygonum hydropiperoides*
Switchgrass	*Panicum virgatum*
Tall Fescue	*Festuca arundinacea*
Tall Thimbleweed	*Anemone virginiana*
Talus Slope Penstemon	*Penstemon digitalis*
Tapered Rosette Grass	*Dichanthelium acuminatum*
Texas Sedge	*Carex texensis*
Tharp's Spiderwort	*Tradescantia tharpii*
Thin Paspalum	*Paspalum setaceum var. ciliatifolium*
Threeflower Melicgrass	*Melica nitens*
Thymeleaf Sandwort	*Arenaria serpyllifolia*
Timothy	*Phleum pratense*
Tiny Bluet	*Houstonia minima*
Tiny Bluet	*Houstonia pusilla*
Toadshade	*Trillium sessile*
Toothed Spurge	*Euphorbia dentata*
Troublesome Sedge	*Carex molesta*
Variable Panicgrass	*Dichanthelium commutatum*
Velvetleaf	*Abutilon theophrasti*
Vente Conmigo	*Croton glandulosus var. septentrionalis*
Verbena	*Verbena X moechina*
Violet Woodsorrel	*Oxalis violacea*
Virginia Creeper	*Parthenocissus quinquefolia*
Virginia Plantain	*Plantago virginica*
Virginia Strawberry	*Fragaria virginiana ssp. grayana*
Virginia Wildrye	*Elymus virginicus*
Water Speedwell	*Veronica catenata*
Watercress	*Nasturtium officinale*
Wedgeleaf Whitlowgrass	*Draba cuneifolia*

Common Name	Accepted Scientific Name
Western Poison Ivy	*Toxicodendron rydbergii*
Western Rockjasmine	*Androsace occidentalis*
White Ash	*Fraxinus americana*
White Avens	*Geum canadense*
White Clover	*Trifolium repens*
White Four O'clock	*Mirabilis albida*
White Mulberry	*Morus alba*
White Oak	*Quercus alba*
White Oldfield Aster	*Aster pilosus*
White Sweetclover	*Melilotus alba*
White Vervain	*Verbena urticifolia*
Wholeleaf Rosinweed	*Silphium integrifolium*
Widowscross	*Sedum pulchellum*
Widowsfrill	*Silene stellata*
Wild Garlic	*Allium vineale*
Wild Goose Plum	*Prunus munsoniana*
Wild Quinine	*Parthenium integrifolium var. hispidum*
Wild Sweetwilliam	*Phlox maculata var. pyramidalis*
Willdenow's Croton	*Crotonopsis elliptica*
Winecup	*Callirhoe digitata*
Wingstem	*Verbesina alternifolia*
Winter Vetch	*Vicia dasycarpa*
Wiry Panicgrass	*Panicum flexile*
Witchgrass	*Panicum capillare*
Woodland Bluegrass	*Poa sylvestris*
Yellow Bristlegrass	*Setaria geniculata*
Yellow Giant Hyssop	*Agastache nepetoides*
Yellow Indiangrass	*Sorghastrum nutans*
Yellow Pimpernel	*Taenidia integerrima*
Yellow Salsify	*Tragopogon dubius*
Yellow Sweetclover	*Melilotus officinalis*
Yellowfruit Sedge	*Carex annectens*
Yellowfruit Sedge	*Carex annectens var. xanthocarpa*

APPENDIX D

D. NEPA AND OTHER COMPLIANCE

1. The Environmental Assessment is attached to the fire management as a separate section.

2. Letters received from the scoping phase are included in this section. The Finding of No Significant Impact was completed after public review and agency consultation was complete.

County of GREENE State of Missouri

GREENE COUNTY COMMISSION
940 Boonville Avenue
SPRINGFIELD MO, 65802
(417) 868-4112

DAVID L. COONROD
Presiding Commissioner
DARRELL DECKER
Commissioner 1st District
JIM PAYNE
Commissioner 2nd District

SUPT
ADMN
I&VS
Rec @ Wilson's Creek NB:
MAR - 6 2002
RFS MGT

February 28, 2002

Mr. Richard A. Lusardi
National Park Service
Wilson's Creek National Battlefield
6424 W. Farm Road 182
Republic, MO 65738-9514

RE: Fire Management Plan

Dear Mr. Lusardi:

The members of the Greene County Commission are in receipt of your correspondence dated February 22, 2002. We do not have any specific issues or concerns to bring to your attention at this time regarding the fire management plan, other than it be coordinated with the local fire protection district, other state and local agencies, and the surrounding landowners, which you are doing as a part of this process.

We encourage and support your efforts to manage and preserve this valuable resource which is important to the history of the citizens of Greene County and the nation. If you have any questions, or need any further information, please contact us.

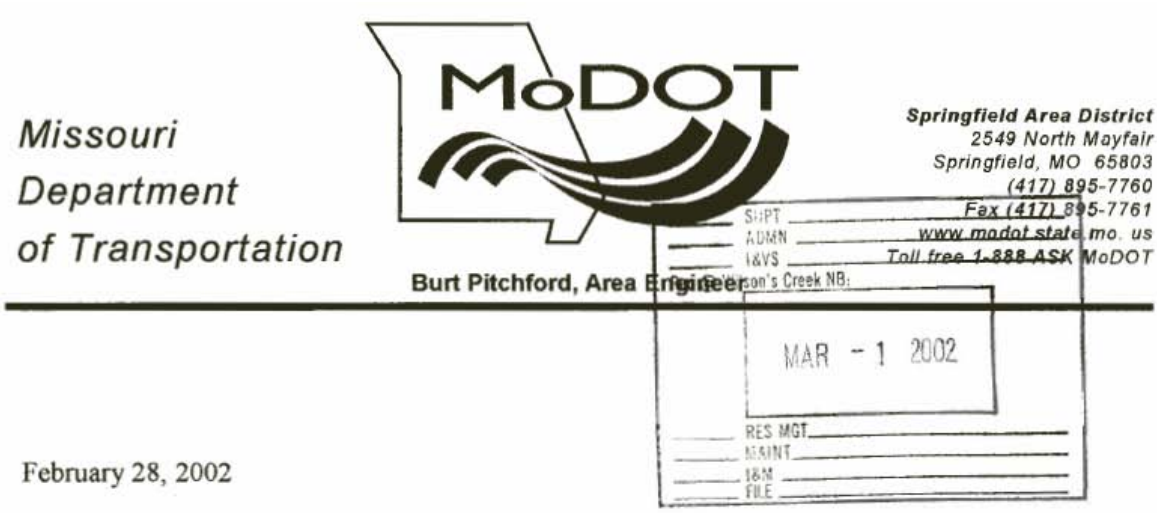
Sincerely,

David L. Coonrod
Presiding Commissioner

(out of the office)
Darrell Decker
Commissioner District 1

Jim Payne
Commissioner District 2

c: Mr. Kent Morris, ACIP, Director
Planning & Zoning Section



Missouri Department of Transportation

MoDOT

Springfield Area District
2549 North Mayfair
Springfield, MO 65803
(417) 895-7760
Fax (417) 895-7761
www.modot.state.mo.us
Toll free 1-888-ASK MoDOT

Burt Pitchford, Area Engineer

SUPT
ADMN
I&VS
Wilson's Creek NB

MAR - 1 2002

RES MGT
MAINT
I&M
FILE

February 28, 2002

Mr. Richard A. Lusardi
Wilson's Creek National Battlefield
6424 West Farm Road 182
Republic MO 65738-9514

Dear Richard:

Thank you for including MoDOT in any of your processes and planning at Wilson's Creek National Battlefield.

We have no issues with your Fire Management Plan.

I will continue to update you on any issues in the area of Wilson's Creek National Battlefield from our end.

Have a wonderful day.

Sincerely,

Burt Pitchford, P.E.
Area Engineer

ln

"Our mission is to preserve, enhance and support Missouri's transportation systems."

2. SHPO – NHPA consultation

STATE OF MISSOURI

Bob Holden, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

SUPT
ADMN
I&VS
Rec @ Wilson's Creek NB:
MAR 25 2002
RES MGT
MAINT
I&M
FILE

19 March 2002

Richard A. Lusardi
Superintendent
Wilson's Creek National Battlefield
6424 W. Farm Road 182
Republic, Missouri 65738

Re: Fire Management Plan Update (NPS) Wilson's Creek National Battlefield, Greene County, Missouri

Dear Mr. Lusardi:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which require identification and evaluation of cultural resources.

We have reviewed the information provided concerning the proposed updating of the Fire Management Plan for Wilson's Creek National Battlefield. Our primary concern would be about such actions as where fire lines are placed, methods for protecting historic architecture during controlled burns or wildfire suppression. We would also recommend the incorporation of documentation by photography and site plans for any National Register of Historic Places properties that could be affected by fire.

We look forward to working with you as the National Park Service gathers information and prepares an Environmental Assessment. If you have any questions, please write or call Judith Deel at 573/751-7862. Please be sure to include the SHPO Log Number (W034) on all future correspondence or inquiries relating to this project.

Sincerely,

HISTORIC PRESERVATION PROGRAM

Claire F. Blackwell
Director and Deputy
State Historic Preservation Officer

CFB:jd

3. FWS Section 7 Consultation

No response was received from FWS during the initial scoping. Staff instead utilized the information on Federally listed species documented in a June 30, 1999 letter from the FWS during consultation on the General Management Plan.

The U.S. Fish and Wildlife Service was consulted informally regarding this project, and agreed with the park's finding of no effect on threatened and endangered species. A copy of the environmental assessment was sent to the Service on November 24, 2004. The FWS concurred with the finding of no affect in a response letter dated December 22, 2004.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Missouri Ecological Services Office
608 East Cherry Street
Room 200
Columbia, MO 65201
Phone: (573) 876-1911 **Fax:** (573) 876-1914

June 30, 1999

David M. Lee
Natural Resource Specialist
National Park Service
Denver Service Center
12795 W. Alameda Parkway
Denver, Colorado 80225-0287

RE: Wilson's Creek National Battlefield Park
D5019 (DSC-RP)
WICR 300 02

Dear Mr. Lee:

This letter is in reference to your request we received on May 18, 1999, for information on fish and wildlife resources that occur at Wilson's Creek National Battlefield Park in Greene County, Missouri. This response is provided by the U.S. Fish and Wildlife Service under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (32 U.S.C. 4321-4327), and the Endangered Species Act of 1973, (16 U.S.C. 1531-1543).

Two federally listed endangered species occur in Wilson's Creek National Battlefield Park. The Missouri bladderpod *(Lesquerella filiformis)* is an annual plant from the mustard family. The species presently occurs on limestone glades and outcrops in Dade, Greene, Christian and Lawrence counties. Yellow flowers occur at the tops of the 4-8 inch tall plant in April and May. The Missouri bladderpod occurs in shallow soils on limestone glades, outcrops in pastures and rarely in rocky open woods. The plant is a winter annual, germinating in the fall and overwintering in the form of basal rosettes. Plants send up flowering stems in late April, and flower, fruit and senesce by the end of June.

The Gray bat *(Myotis grisescens)* occupies a limited geographic range in limestone karst areas of the southeastem United States, including Missouri. With rare exception, the g a y bat roosts in caves year-round. In winter, most gray bats hibernate in vertical (pit) caves with cool, stable temperatures below 10 degrees Celsius. Summer caves, especially those used by maternity colonies, are nearly always located within a kilometer (0.6 mile) of rivers or reservoirs over which bats feed. The summer caves are warm with dome ceilings that trap body heat. Most gray bats migrate seasonally between hibernating and maternity caves, and both types of caves are

Mr. David M. Lee Page 2

located in Missouri. Gray bats are active at night, foraging for insects over water or along shorelines, and they need a corridor of forest riparian cover between roosting caves and foraging areas. They can travel as much as 20 kilometers (12 miles) from their roost caves to forage.

If you have not already done so, we recommend you contact the Policy Coordination Section of the Missouri Department of Conservation (MDC), P.O. Box 180, Jefferson City, Missouri 65102-0180, for information concerning state-listed rare and endangered species. All federally-listed species are also state-listed, so any information you receive from MDC will likely assist you in determining whether a federally-listed species may be affected by your project.

We appreciate the opportunity to provide the enclosed information. Should you have questions, or if we can be of any further assistance, please contact Andy Roberts at (573)876-1911, ext. 110.

Sincerely,

for

R. Mark Wilson
Field Supervisor

cc: MDC; Jefferson City, MO (Attn: Gary Christoff)
MDC; Jefferson City, MO (Attn: Amy Salveter)

ADR:ar:990455

REVISED
11:42 am, 3/30/07

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Columbia Ecological Services Field Office
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203-0057
Phone: (573) 234-2132 Fax: (573) 234-2181

December 22, 2004

Mr. T. John Hillmer, Jr.
National Park Service
Wilson's Creek National Battlefield
6424 W. Farm Road 182
Republic, Missouri 65738-9514

RE: Draft Environmental Assessment on Fire Management Plan for Wilson's Creek National Battlefield

Dear Mr.Hillmer:

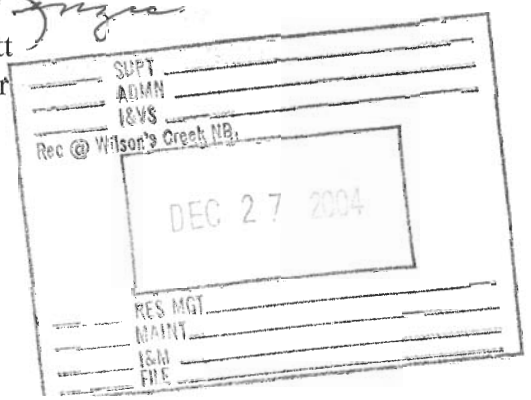
This letter is in response to your November 24, 2004, request for concurrence that the implementation of the above referenced plan will not adversely affect the Missouri bladderpod (*Lesquerella filiformis*) or gray bat (*Myotis grisescens*). This response is provided by the U.S. Fish and Wildlife Service (Service) under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4327), and the Endangered Species Act of 1973, (16 U.S.C. 1531-1543).

We have reviewed the subject draft Environmental Assessment and fire management plan and concur with your determination that the implementation of the plan will not adversely affect the Missouri bladderpod or gray bat. The measures incorporated in your plan will have a beneficial affect on both of these species.

We appreciate your continued coordination and commend your efforts to recover these species. Should you have questions, or if we can be of any further assistance, please contact Andy Roberts at (573) 234-2132, extension 110.

Sincerely,

for Charles M. Scott
Field Supervisor



cc: MDC; Jefferson City, MO (Attn. Gene Gardner)
MDC; Jefferson City, MO (Attn. Peggy Horner)

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4. NAGPRA Consultation. Several American Indian tribes have demonstrated interest in the areas within Wilson's Creek National Battlefield. A summary of the environmental assessment were sent to the Osage, Delaware, and Cherokee Nations. The Osage Nation responded by letter on December 15, 2004. The tribe determined that the site could have religious or cultural significance to the Osage Tribe and if construction activities should expose Osage archeological materials, such as bone, pottery, chipped stone, etc, we ask that construction activities cease, and there office be contacted so that an evaluation can be made. The Delaware Nation responded by letter on December 14th, 2004. The Delaware Nation is particularly concerned with archeological sites that may contain human burial remains and associated funerary objects. They agreed that the action does not appear to endanger archeological sites but deferred to the state archeologist and SHPO regarding the need for archaeological surveys or further investigation. Should archeological surveys be required the tribe would like copies of the surveys, site forms and reports.

JIM GRAY
Principal Chief

KENNETH H. BIGHORSE
Assistant Principal Chief

OSAGE TRIBAL COUNCIL

MEMBERS OF COUNCIL
MARK FREEMAN Jr.
TERRY MASON MOORE
HARRY ROY RED EAGLE
JODIE SATEPAUHOODLE
JERRY SHAW
PAUL R. STABLER
DUDLEY WHITEHORN
JOHN W. WILLIAMS

SUPT
ADMIN
I&VS
Rec @ Wilson's Creek NB:
DEC 20 2004
RES MGT
MAINT
I&M
FILE

December 15, 2004

US Department of the Interior
National Park Service
6424 W. Farm Road 182
Republic, MO 65738-9514

RE: Wilson's Creek National Battlefield

To Whom It May Concern:

The Osage Tribe of Oklahoma has evaluated the above reference sites, and we have determined that the site could have religious or cultural significance to the Osage Tribe being our former reservation & homeland. However, if construction activities should expose Osage archeological materials, such as bone, pottery, chipped stone, etc., we ask that construction activities cease, and this office be contacted so that an evaluation can be made

Should you have any questions, you can reach me at (918) 287-5446.

Thank you.

Sincerely,

Anthony P. Whitehorn
Tribal Enterprise Manager

Osage Tribal Council, P.O. Box 779, Pawhuska, OK 74056, (918) 287-5432, FAX (918) 287-2257

Delaware Nation NAGPRA Office

P.O. Box 825, Anadarko, OK 73005
Phone: (405) 247-2448
Fax: (405) 247-9393

14 December 2004

ATTN: T. John Hillmer, Jr.
National Park Service
Wilson's Creek National Battlefield
6424 W. Farm Road 182
Republic, MO 65738-9514

RE: Wilson's Creek National Battlefield

Dear Mr. Hillmer, Jr.:

Thank you for contacting the Delaware Nation regarding the above referenced project. The Delaware Nation is committed to protecting archaeological sites that are important to tribal heritage, culture, and religion. Furthermore, the tribe is particularly concerned with archaeological sites that may contain human burial remains and associated funerary objects.

As described in your correspondence, the proposed ground disturbing activity of this project does not appear to endanger archaeological sites of interest to the Delaware Nation. Therefore, the Delaware Nation will defer to your State Archaeologist and your state's Office of Historical Preservation regarding the need for archaeological surveys or further investigation. Should either of these agencies recommend an archaeological survey of the proposed construction site, we ask that the Delaware Nation be informed of the results of the survey, including copies of site forms and reports. Also, any changes to the above referenced project should be resubmitted to the NAGPRA Director of the Delaware Nation for review.

Should this project inadvertently uncover an archaeological site, even after an archaeological survey, we request that you immediately contact the appropriate state agencies, as well as the Delaware nation. Also, we ask that you halt all construction and ground disturbing activities until the tribe and these state agencies are consulted.

We appreciate your cooperation in contacting the Delaware Nation. Should you have any questions, feel free to contact me.

Sincerely,

Tamara Francis
NAGPRA/Cultural Preservation Director,

APPENDIX E

E. ANNUAL REVISION DOCUMENTS

1. Fire Call-up List

Contact	Office Phone	Home Phone	Cell Phone
Bobby Bloodworth, Fire Management Officer	573-323-4236 ext. 252	573-323-8029	573-300-0840
Gary Sullivan, Chief of Resource Management	417-732-2662 ext. 286	417-725-6087	417-880-2119
Ted Hillmer, Superintendent	417-732-2662 ext. 224		417-838-7699
John Sutton, Chief Ranger	417-732-2662 ext. 225		417-838-0082
Weldon Young, Law Enforcement Ranger	417-732-2662 ext. 274		417-838-0014
Paula Velten, Administrative Officer	417-732-2662 ext. 228		
Mike Debacker, LTEM Coordinator	417-732-2662 ext. 269		

The Missouri-Iowa Interagency Coordination Center is managed by the Mark Twain National Forest and can be contacted for assistance at any time circumstances dictate. This contact will bring any resources necessary to the assistance of the Battlefield. Sandy Mendenhall is the Zone 2 Dispatcher and can be reached at (573) 341-7424; Cell 573-300-0846; Home 573-426-4988.

Table 1 - Local Cooperators

Fire Department List (by county

Tuesday, August 03, 2004

Dept Name	Mailing Address	City	Zip	Chief	Daytime Phone	FDID
CHRISTIAN	BILLINGS FIRE PROT DIST	P O BOX 318	BILLINGS	65610	HENRY BOS	417-744-4228	02207
CHRISTIAN	CHADWICK RURAL FIRE DEPARTMENT	P.O. BOX 221	CHADWICK	65629	MARK LOVELAND	(417) 634-2029	02205
CHRISTIAN	CLEVER FIRE PROTECTION DISTRICT	P O BOX 192	CLEVER	65631	DAVID HABERICHTER	4173692475	02203
CHRISTIAN	HIGHLANDVILLE FIRE PROTECTION DIST.	P.O. BOX 26	HIGHLANDVILLE	65669	EVAN GILBERT	417-587-3652	02201
CHRISTIAN	NIXA FIRE PROTECTION DISTRICT	301 S. NICHOLAS RD	NIXA	65714	JIMMY SEBREE	417-725-4025	02204
CHRISTIAN	OZARK FIRE DEPARTMENT	602 N. 3RD ST	OZARK	65721	JAKE ARCHER	(417) 581-4515	02202
CHRISTIAN	OZARK RURAL FIRE PROT. DIST.	P O Box 917	OZARK	65721	JAKE ARCHER	(417) 583-3439	02206
CHRISTIAN	SPARTA FIRE PROTECTION DIST.	P. O. BOX 250	SPARTA	65753	DOUG FAVOR	4172071678	02208
GREENE	ASH GROVE FIRE PROTECTION DISTRIC	P.O. BOX 155	ASH GROVE	65604	MIKE DAVIS	(417) 751-3300	03916
GREENE	BATTLEFIELD FIRE PROTECTION DIST.	4117 W. SECOND ST.	BATTLEFIELD	65619	JERRY SPARKMAN	417-881-9018	03901
GREENE	BOIS D' ARC FIRE PROTECTION DISTRIC	10505 W. STATE HWY	BOIS ARC	65612	BRUCE MULLEN	(417) 742-3884	03904
GREENE	BROOKLINE FIRE PROT. DIST.	P.O. BOX 467	BROOKLINE	65619	LARRY MCCONNELL	(417) 882-2014	03903
GREENE	DEPT OF CONSERVATION REGIONAL FO	2630 N. MAYFAIR	SPRINGFIELD	65803			
GREENE	EBENEZER FIRE PROTECTION DISTRICT	7918 N FR 146	SPRINGFIELD	65803	VINCE EDWARDS	(417) 833-0128	03908
GREENE	FAIR GROVE FIRE PROT. DIST.	P. O. BOX 103	FAIR GROVE	65648	RON LONG	417-759-2628	03913
GREENE	LOGAN-ROGERSVILLE FIRE PROT. DIST.	3427 S. ST HWY 125	ROGERSVILLE	65742	RICHARD STIRTS	(417) 753-4265	03911
GREENE	PLEASANT VIEW FIRE PROTECTION DIST	2313 E. STATE HWY A	SPRINGFIELD	65803	CHRIS HENSON	(417) 833-9775	03912
GREENE	REPUBLIC FIRE DEPARTMENT	701 US HWY 60 EAST	REPUBLIC	65738	DON MURRAY	417-732-1950	03902
GREENE	SPRINGFIELD FIRE DEPARTMENT	830 N. BOONVILLE R	SPRINGFIELD	65802	STEVE STRADER	417-864-1500	03907
GREENE	STRAFFORD FIRE PROT. DIST.	P.O. BOX 9	STRAFFORD	65757	JEROME SCHIMAN	(417) 831-3933	03909
GREENE	WALNUT GROVE FIRE PROT DIST	109 N. WASHINGTON	WALNUT GROVE	65770	JIM CUMMINS	(417) 788-2670	03906
GREENE	WEST REPUBLIC FIRE PROT. DIST.	11088 W. FR 168	REPUBLIC	65738	ERIC GHAN	417-732-7183	03914
GREENE	WILLARD FIRE PROT. DIST.	P.O. BOX 455	WILLARD	65781	GARY WIRTH	417-742-2525	03905

TABLE 2 - KEY INTERAGENCY CONTACTS

Mandatory Contact List: All persons or entities on this list will be contacted prior to ignition of prescribed burns.

Name	Agency	Phone Number	Date Notified
Dispatcher	Green County Sheriff	(417)868-4040	Burn day
Dispatcher	Christian County Sheriff	(417)581-2332	Burn day
Dispatcher	Missouri State Patrol	(417)895-6868	Burn day
Dispatcher	Battlefield VFD	(417)868-4040	Burn day
Dispatcher	Clever VFD	(417)868-4040	Burn day
KAMO Electric Coop	Vinita, OK	(918)256-5551 x217	2 days prior
U.S. Forest Service	Mark Twain N.F., Ava District	(417)683-4428	Burn day
Barnes, Richard	Air Pollution Control Dept., Missouri Dept. of Natural Resources, Springfield, MO	(471)891-4328	1 week prior
Parker, Duane	State Forester, Missouri Dept. of Conservation, Springfield, MO	(417)895-6880	

Optional Cooperator Contact List: Every effort will be made to contact these cooperators before ignition, however , notification is optional and is not required.

Name	Agency	Phone Number	Date Notified
Davis, William	Director, National Weather Service	869-4491 or 863-7889	1 week prior
Shumway, Steve	National Weather Service	869-4491 or 863-7889	1 week prior

2. Preparedness Inventory

Location: Engine					
Category	**Product**	**Supplier**	**On Hand**	**Reorder Level**	**Max Stocking**
Batteries,	Batteries, headlamp	GSA	4	2	4
Batteries,	Batteries, portable	LOCAL PURCHASE	4	2	4
Fittings	Adapter, 1" NPSH-F to	GSA	3	1	3
Fittings	Adapter, 2 ½"NPSH-F to 1	GSA	2	0	0
Fittings	Adapter, 2" NPSH-F to 1	GSA	1	0	0
Fittings	Clamp, Hose	GSA	1	1	1
Fittings	Coupling, 1 ½"NH, Double-Male	GSA	1	1	1
Fittings	Coupling, 1" NPSH,	GSA	1	1	1
Fittings	Coupling, 1" NPSH,	GSA	1	1	1
Fittings	Coupling, 1½"NH, Double	GSA	2	1	2
Fittings	Gaskets, Hose	LOCAL PURCHASE	1	1	1
Fittings	Increaser, 1" NPSH-F to 1 ½"	GSA	1	1	1
Fittings	Increaser, 3/4"NH-F to 1"	GSA	2	1	2
Fittings	Nozzle, 1" NPSH	GSA	2	1	2
Fittings	Nozzle, adjustable 1 1/2"	GSA	3	2	3
Fittings	Nozzle, adjustable 1" NPSH	GSA	2	1	2
Fittings	Nozzle, adjustable 3/4" NH	GSA	2	1	2
Fittings	Nozzle, foam 1 1/2" NH	GSA	1	1	1
Fittings	Nozzle, foam 3/4" NH	GSA	1	1	1
Fittings	Reducer, 1 ½"NH-F to 1" NH-M	GSA	2	1	2
Fittings	Reducer, 2 ½"NH-F to 1	GSA	1	1	1
Fittings	Tee, 1"NPSH-F x 1"NPSH-M x	GSA	2	1	2
Fittings	Tee, 1½"NH-F X 1½"NH-M X 1"	GSA	2	1	2
Fittings	Tee, 1½"NH-F X 1½"NH-M X	GSA	2	1	2
Fittings	Tip, mopup	GSA	2	1	2

Location: Engine					
Category	**Product**	**Supplier**	**On Hand**	**Reorder Level**	**Max Stocking**
Fittings	Valve, 1 ½" shut off	GSA	1	1	1
Fittings	Valve, 1" shut off	GSA	1	1	1
Fittings	Valve, 1½"NH-F, AUTO CHECK	GSA	1	1	1
Fittings	Valve, 3/4"NH shut off	GSA	2	1	2
Fittings	Valve, foot w/strainer	LOCAL PURCHASE	1	1	1
Fittings	Wand, mopup	GSA	2	1	2
Fittings	Wye, 1 ½ "NH Two Way Gated	GSA	2	1	2
Fittings	Wye, 1"NPSH Two Way Gated	GSA	1	1	1
Fittings	Wye, 3/4"NH W/ball valve Gated	GSA	4	2	4
Foam	Foam	GSA	1	1	1
Hose	Hose, 1 1/2 engine protection	LOCAL PURCHASE	1	1	1
Hose	Hose, 1 1/2 refill 15'	LOCAL PURCHASE	1	1	1
Hose	Hose, 1 1/2" NH (100')	GSA	3	2	3
Hose	Hose, 1" NPSH (100')	GSA	3	2	3
Hose	Hose, 3/4" NH (100')	GSA	3	2	3
Hose	Hose, booster	GSA	2	1	2
Hose	Hose, Suction	LOCAL PURCHASE	2	1	2
Medical-1st	10-Person First Aid Kit	GSA	1	1	1
Medical-1st	Body Fluid Barrier Kit	GSA	1	1	1
Medical-1st	Burn Kit	LOCAL PURCHASE	1	1	1
Medical-1st	Kit, First Aid-Personal	GSA	1	1	1
Misc.	Binoculars	LOCAL PURCHASE	1	1	1
Misc.	Bolt Cutters	LOCAL PURCHASE	1	1	1
Misc.	Chock Blocks	LOCAL PURCHASE	1	1	1
Misc.	Drip Torch	GSA	1	1	1
Misc.	File, Bastard	GSA	2	1	2
Misc.	Filter, Air	LOCAL PURCHASE	1	1	1
Misc.	Filter, Gas	LOCAL PURCHASE	1	1	1
Misc.	Filter, oil	LOCAL PURCHASE	1	1	1
Misc.	Fire Extinguisher, 5#	GSA	1	1	1
Misc.	Flagging, black and	GSA	1	1	1

Location: Engine					
Category	**Product**	**Supplier**	**On Hand**	**Reorder Level**	**Max Stocking**
	yellow				
Misc.	Flagging, lime green	GSA	1	1	1
Misc.	Flashlight	GSA	1	1	1
Misc.	Foam Unit	1	1	1	
Misc.	Fusees	GSA	1/2	1	1
Misc.	Gas Can, Safety (5 gal)	GSA	3	3	3
Misc.	Headlamp	GSA	1	1	1
Misc.	Jack	LOCAL PURCHASE	1	1	1
Misc.	Kit, Belt Weather	GSA	1	1	1
Misc.	Lug Wrench	LOCAL PURCHASE	1	1	1
Misc.	MRE's	GSA	1	1	1
Misc.	Pail, Collapsible	GSA	1	1	1
Misc.	Pliers, Fence	LOCAL PURCHASE	1	1	1
Misc.	Reflector Set	LOCAL PURCHASE	1	1	1
Misc.	Rope (50')	LOCAL PURCHASE	1	1	1
Misc.	Sheeting, Plastic	GSA	1	1	1
Misc.	Spark Plug	LOCAL PURCHASE	2	1	2
Misc.	Tape, Duct	GSA	1	1	1
Misc.	Tape, Electrical	LOCAL PURCHASE	1	1	1
Misc.	Tape, Filament	GSA	1	1	1
Misc.	Tape, Teflon	LOCAL PURCHASE	2	1	2
Misc.	Tool Kit, General	LOCAL PURCHASE	1	1	1
Misc.	Tow Chain	GSA	1	1	1
Misc.	Wrench, Hydrant 8"	GSA	1	1	1
Misc.	Wrench, Pipe 14"	GSA	1	1	1
Misc.	Wrench, Pipe 20"	LOCAL PURCHASE	1	1	1
Misc.	Wrench, Spanner 11"	GSA	2	1	2
Misc.	Wrench, Spanner 5"	GSA	4	1	4
Packs &	Knapsack	GSA	1	1	1
PPE, Other	Ear Plugs	GSA	1	1	1
PPE, Other	Gloves, forest worker	GSA	2	1	2
PPE, Other	Goggles	GSA	1	1	1
PPE, Other	Helmet, Safety	GSA	1	1	1
PPE, Other	Mask, Dust	GSA	1	1	1
PPE, Other	Shelter, Fire w/Case and Liner	GSA	1	1	1
Radio	Radio, Portable	LOCAL PURCHASE	1	1	1

Location: Engine					
Category	**Product**	**Supplier**	**On Hand**	**Reorder Level**	**Max Stocking**
Tools	Axe	LOCAL PURCHASE	1	1	1
Tools	Backpack Pumps	GSA	3	2	3
Tools	Brush Cutter	LOCAL PURCHASE	1	1	1
Tools	Chain Saw	LOCAL PURCHASE	1	1	1
Tools	Chainsaw Kit	GSA	1	1	1
Tools	Combi Tool	GSA	1	1	1
Tools	Flapper, fire	GSA	1	1	1
Tools	McLeod Tool	GSA	1	1	1
Tools	Portable Pump (Honda)	LOCAL PURCHASE	1	1	1
Tools	Pulaski	GSA	2	1	2
Tools	Rake, leaf	LOCAL PURCHASE	1	1	1
Tools	Shovel	GSA	2	1	2

3. Cooperative Agreements

MEMORANDUM OF UNDERSTANDING
Between.

NATIONAL PARK SERVICE
WILSON'S CREEK NATIONAL BATTLEFIELD
And

BROOKLINE FIRE DISTRICT

This Memorandum of Understanding is entered into between the Brookline Fire Protection District, acting through and by the President, hereinafter referr to as BROOKLINE and the National Park Service, acting through the Superintendent, Wilson's Creek National Battlefield, hereinafter referred to as WILSON'S CREEK.

AUTHORITY

The Act of May 27, 1955, et seq., 42 U.S.C. § 1856(a), and 16 U.S.C. §§ 1b(1) and 1b(8) authorize agencies of the United States to enter into agreements with other fire protection organizations to render emergency fire fighting a mutual assistance in the suppression of fires.

PURPOSE

The purpose of this agreement is to establish the terms and conditions under which WILSON'S CREEK and BROOKLINE will furnish supplies and materials and/o assistance to each other in suppressing structural fires and wildfires. The area surrounding the Brookline community in Greene County, Missouri, and the federal properties and developments located within Wilson's Creek National Battlefield will be benefited by the agreement.

NOW THEREFORE, the parties hereby agree as follows:

STRUCTURAL FIRES ON PARK ADMINISTERED LANDS:

BROOKLINE AGREES TO:

A. Be the primary responder for structural fires, vehicle fires and vehicle accident extrications. WILSON'S CREEK will provide a representative to coordinate with BROOKLINE on all emergency services rendered on park propert

B. Respond to and engage in the immediate containment and suppression of all structural fires in the park.

C. Respond to requests from WILSON'S CREEK to supply fire engines, water tenders/tankers, water and personnel and otherwise assist in wildfire suppression and structural protection from wildfires within the park. Park request will be made through the Chief, Brookline Fire Protection District.

D. Participate in annual familiarization tours of park curatorial facilitie and flammable/hazardous materials storage locations.

WILSON'S CREEK AGREES TO:

E. Provide initial fire extinguisher response to all structural fires and vehicle fires within the park.

F. Cooperate and coordinate with BROOKLINE command personnel in facilitatin suppression of structural fires in the park.

G. Permit BROOKLINE to use park hydrants and water resources for fighting

fires.

H. Provide annual familiarization tour of park curatorial facilities and flammable/hazardous materials storage locations.

WILDLAND FIRES OUTSIDE PARK ADMINISTERED LANDS:

WILSON'S CREEK agrees to respond with qualified personnel and with equipment to any wildfire outside the park but within Brookline Fire District, at the request of the Chief, Brookline Fire Protection District. The response by WILSON'S CREEK personnel will be in accordance with federal wildland fire policies and procedures.

WILSONS'S CREEK AND BROOKLINE MUTUALLY AGREE TO THE FOLLOWING:

A. Employees/volunteers of the Brookline Fire Protection District are not considered employees of the National Park Service.

B. BROOKLINE specifically waives reimbursement for any cost incurred in fighting fires in the park, pursuant to this agreement.

C. The obligations of WILSON'S CREEK under this agreement are contingent upon the appropriation of funds by Congress for this purpose.

D. WILSON'S CREEK and BROOKLINE waive all claims against each other for compensation for any loss, damage, personal injury or death occurring during activities under this agreement.

E. WILSON'S CREEK and BROOKLINE agree to manage any structural fire within the park or other mutual aid incident under the Incident Command System (ICS).

F. WILSON'S CREEK and BROOKLINE agree to cooperate on fire investigations, incident reporting and the sharing of information on fires in the mutual aid area.

TERM OF THE AGREEMENT:

The term of this agreement is five (5) years. WILSON'S CREEK and BROOKLINE will jointly review the results of the agreement at the end of each calendar year.

KEY OFFICIALS:

The Superintendent, Wilson's Creek National Battlefield has the authority and responsibility for managing this agreement on behalf of WILSON'S CREEK.

The Fire Chief, Brookline Fire Protection District, has the authority and responsibility for managing this agreement on behalf of BROOKLINE.

REQUIRED CLAUSES:

A. No member or delegate to Congress, or resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

B. During the performance of this agreement, the participants agree to abide by the terms of Executive Order 11246 on non-discrimination and will not discriminate against any person because of race, color, religion, sex, or national origin. The participants will take affirmative action to ensure that applicants are employed without regard to their race, color, religion, sex, or national origin.

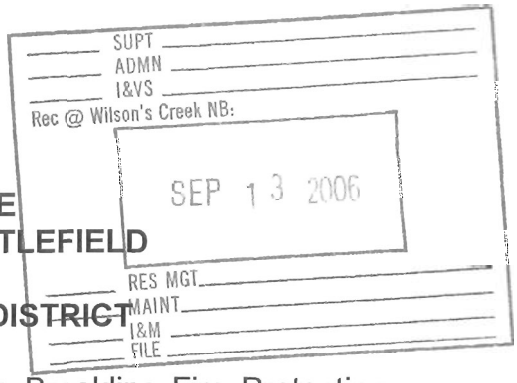
AUTHORIZED SIGNATURES

Dated this 5 day of June, 2001

Richard A. Lusardi, Superintendent
Wilson-s Creek National Battlefield

Kirk J. Larson, President
Brookline Fire Protection District

REVISED
11:38 am, 3/30/07



GENERAL AGREEMENT
Between
NATIONAL PARK SERVICE
WILSON'S CREEK NATIONAL BATTLEFIELD
And
BROOKLINE FIRE PROTECTION DISTRICT

This General Agreement is entered into between the Brookline Fire Protection District, acting through and by the President, hereinafter referred to as BROOKLINE and the National Park Service, acting through the Superintendent, Wilson's Creek National Battlefield, hereinafter referred to as WILSON'S CREEK.

AUTHORITY

The Act of May 27, 1955, *et seq.*, 42 U.S.C. § 1856(a), and 16 U.S.C. §§ 1b(1) and 1b(8) authorize agencies of the United States to enter into agreements with other fire protection organizations to render emergency fire fighting and mutual assistance in the suppression of fires.

PURPOSE

The purpose of this agreement is to establish the terms and conditions under which WILSON'S CREEK and BROOKLINE will furnish supplies and materials and/or assistance to each other in suppressing structural fires and wildfires. The area surrounding the Brookline community in Greene County, Missouri, and the federal properties and developments located within Wilson's Creek National Battlefield will be benefited by the agreement.

NOW THEREFORE, the parties hereby agree as follows:

FIRES ON PARK ADMINISTERED LANDS:

BROOKLINE AGREES TO:

A. Be a primary responder for structural fires, wildland fires, vehicle fires and vehicle accident extrications. WILSON'S CREEK will provide a representative to coordinate with BROOKLINE on all emergency services rendered on park property.

B. Respond to and engage in the immediate containment and suppression of all structural and wildland fires in the park.

C. Respond to requests from WILSON'S CREEK to supply fire engines, water tenders/tankers, water and personnel and otherwise assist in wildland fire suppression and structural protection from wildfires within the park. Park requests will be made through the Chief, BROOKLINE Fire Protection District.

REVISED
11:38 am, 3/30/07

D. Participate in annual familiarization tours of park curatorial facilities and flammable/hazardous materials storage locations.

WILSON'S CREEK AGREES TO:

E. Cooperate and coordinate with BROOKLINE command personnel in facilitating suppression of structural and wildland fires in the park.

F. Permit BROOKLINE to use park hydrants and water resources for fighting fires.

G. Provide annual familiarization tour of park curatorial facilities and flammable/hazardous materials storage locations.

WILDLAND FIRES OUTSIDE PARK ADMINISTERED LANDS:

WILSON'S CREEK agrees to respond with qualified personnel and with equipment to any wildfire outside the park but within BROOKLINE Fire District, at the request of the Chief, BROOKLINE Fire Protection District. The response by WILSON'S CREEK personnel will be in accordance with federal wildland fire policies and procedures.

WILSON'S CREEK AND BROOKLINE MUTUALLY AGREE TO THE FOLLOWING:

A. Employees/volunteers of the BROOKLINE Fire Protection District are not considered employees of the National Park Service.

B. Employees/volunteers of Wilson's Creek are not considered employees of the Brookline Fire Department.

C. BROOKLINE specifically waives reimbursement for any cost incurred in fighting fires in the park, pursuant to this agreement.

D. The obligations of WILSON'S CREEK under this agreement are contingent upon staffing and the appropriation of funds by Congress for this purpose.

E. WILSON'S CREEK and BROOKLINE waive all claims against each other for compensation for any loss, damage, personal injury or death occurring during activities under this agreement.

F. WILSON'S CREEK and BROOKLINE agree to manage any structural or wildland fire within the park or other mutual aid incident under the Incident Command System (ICS).

REVISED
11:39 am, 3/30/07

G. WILSON'S CREEK and BROOKLINE agree to cooperate on fire investigations, incident reporting and the sharing of information on fires in the mutual aid area.

TERM OF THE AGREEMENT:

The term of this agreement is five (5) years. WILSON'S CREEK and BROOKLINE will jointly review the results of the agreement at the end of each calendar year.

KEY OFFICIALS:

The Superintendent, Wilson's Creek National Battlefield has the authority and responsibility for managing this agreement on behalf of WILSON'S CREEK.

The Fire Chief, BROOKLINE Fire Protection District, has the authority and responsibility for managing this agreement on behalf of BROOKLINE.

REQUIRED CLAUSES:

A. No member or delegate to Congress, or resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

B. During the performance of this agreement, the participants agree to abide by the terms of Executive Order 11246 on non-discrimination and will not discriminate against any person because of race, color, religion, sex, or national origin. The participants will take affirmative action to ensure that applicants are employed without regard to their race, color, religion, sex, or national origin.

AUTHORIZED SIGNATURES

Dated this 14th day of August, 2006

T. John Hillmer, Superintendent
Wilson's Creek National Battlefield

Kirk Larson, President
Brookline Fire Protection District

MEMORANDUM OF UNDERSTANDING
Between

NATIONAL PARK SERVICE
WILSON'S CREEK NATIONAL BATTLEFIELD
And

CLEVER FIRE DISTRICT

This Memorandum of Understanding is entered into between the Clever Fire Protection District, acting through and by the President, hereinafter referred to as CLEVER and the National Park Service, acting through the Superintendent, Wilson's Creek National Battlefield,,hereinafter referred to as WILSON'S CREEK.

AUTHORITY

The Act of May 27, 1955, et *seq.*, 42 U.S.C. § 1856(a), and 16 U.S.C. §§ 1b(1) and 1b(8) authorize agencies of the United States to enter into agreements with other fire protection organizations to render emergency fire fighting and mutual assistance in the suppression of fires.

PURPOSE

The purpose of this agreement is to establish the terms and conditions under which WISLON'S CREEK and CLEVER will furnish supplies and materials and/or assistance to each other in suppressing structural fires and wildfires. The area surrounding the Clever community in Christian County, Missouri, and the federal properties and developments located within Wilson's Creek National Battlefield will be benefited by the agreement.

NOW THEREFORE, the parties hereby agree as follows:

STRUCTURAL FIRES ON PARK ADMINISTERED LANDS:

CLEVER AGREES TO:

A. Be a primary responder for structural fires, wildland fires, vehicle fires and vehicle accident extrications. WILSON'S CREEK will provide a representative to coordinate with CLEVER on all emergency services rendered on park property.

B. Respond to and engage in the immediate containment and suppression of all structural and wildland fires in the park.

C. Respond to requests from WILSON'S CREEK to supply fire engines, water tenders/tankers, water and personnel and otherwise assist in wildland fire suppression and structural protection from wildfires within the park. Park requests will be made through the Chief, Clever Fire Protection District.

D. Participate in annual familiarization tours of park curatorial facilities and flammable/hazardous materials storage locations.

WILSON'S CREEK AGREES TO:

E. Provide initial fire extinguisher response to all structural fires and vehicle fires within the park.

F. Cooperate and coordinate with CLEVER command personnel in facilitating suppression of structural and wildland fires in the park.

G. Permit CLEVER to use park hydrants and water resources for fighting fires.

H. Provide annual familiarization tour of park curatorial facilities and flammable/hazardous materials storage locations.

WILDLAND FIRES OUTSIDE PARK ADMINISTERED LANDS:

WILSON'S CREEK agrees to respond with qualified personnel and with equipment to any wildfire outside the park but within Clever Fire District, at the request of the incident commander. The response by WILSON'S CREEK personnel will be in accordance with federal wildland fire policies and procedures.

WILSON'S CREEK AND CLEVER MUTUALLY AGREE TO THE FOLLOWING:

A. Employees/volunteers of the Clever Fire Protection District are not considered employees of the National Park Service.

B. CLEVER specifically waives reimbursement for any cost incurred in fighting fires in the park, pursuant to this agreement.

C. The obligations of WILSON'S CREEK under this agreement are contingent upon the appropriation of funds by Congress for this purpose.

D. WILSON'S CREEK and CLEVER waive all claims against each other for compensation for any loss, damage, personal injury or death occurring during activities under this agreement.

E. WILSON'S CREEK and CLEVER agree to manage any structural or wildland fire within the park or other mutual aid incident under the Incident Command System (ICS).

F. WILSON'S CREEK and CLEVER agree to cooperate on fire investigations, incident reporting and the sharing of information on fires in the mutual aid area.

TERM OF THE AGREEMENT:

The term of this agreement is five (5) years. WILSON'S CREEK and CLEVER will jointly review the results of the agreement at the end of each calendar year.

KEY OFFICIALS:

The Superintendent, Wilson's Creek National Battlefield has the authority and responsibility for managing this agreement on behalf of WILSON'S CREEK.

The Fire Chief, Clever Fire Protection District, has the authority and responsibility for managing this agreement on behalf of CLEVER.

REQUIRED CLAUSES

A. No member or delegate to Congress, or resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

B. During the performance of this agreement, the participants agree to abide by the terms of Executive Order 11246 on non-discrimination and will not discriminate against any person because of race, color, religion, sex, or national origin. The participants will take affirmative action to ensure that applicants are employed without regard to their race, color, religion, sex, or national origin.

AUTHORIZED SIGNATURES

Dated this 18 day of MARCH, 2003

Richard A. Lusardi, Superintendent
Wilson's Creek National Battlefield

Bob Skaggs, President
Clever Fire Protection District

Interpark Agreement
Between:

Ozark National Scenic Rivenvays Fire Management
and
Effigy Mounds National Monument
Fort Larned National Historic Site
Fort Scott National Historic Site
George Washington Carver National Monument
Harry S Truman National Historic Site
Herbert Hoover National Historic Site
Jefferson National Expansion Memorial
Ulysses S. Grant National Historic Site, and
Wilson's Creek National Battlefield

ARTICLE I. PURPOSE

The FIREPRO process arranges for the funding of the fire staff to support the eight National Park Service units listed above. This grouping is known as the Ozark Fire Management Cluster (OZAR). These positions will be referred to in this document collectively as the "Fire Staff'. The purpose of this agreement is to define the mutual responsibilities of the Fire Staff and staffs from the National Park Service units listed above in Missouri, Iowa, Kansas and Illinois in terms of fire management activities.

At certain times of the year, accomplishment of specific fire management objectives (FIREPRO budget submission, project planning, fire management planning, wildfire suppression, preparedness, capitalized equipment request, training request, prescribed fire/fuels planning and implementation) requires expertise and time allocations that may not be fully available in each of the non-firepro staffed parks. The establishment of a Ozark Fire Management Cluster alleviates this situation where the permanent Fire Management Officer and fire staff at Ozark National Scenic Rivenvays are made available to provide technical and professional assistance to the listed above parks in Missouri, Iowa, Kansas and Illinois. This provides greater capability for each park to fully complete their fire management planning and implement the desired fire management program.

ARTICLE II. RESPONSIBILITIES

The duties of the Fire Staff will include providing professional and technical support for the fire management programs at all Ozark Fire Management Cluster units.

A. Specific responsibilities of the Fire Management Staff include:

1. Assist in the development and implementation of wildland fire prevention, preparedness, suppression, and aviation programs through site visits, program reviews, inspections, and other staff work.

2. Assist in coordination of fire-related reports, correspondence, preparation and/or review of fire management plans, and aviation plans. Participate in other fire management planning as requested.

3. Assist in coordination and implementation of prescribed fire programs, fuel treatments, Wildland Urban Interface Initiative and community assistance programs.

4. Coordinate, through appropriate zone coordination centers, mobilization of National Park Service personnel for fire assignments.

5. Develop, coordinate, and conduct fire-related training as necessary to meet wildland fire needs of the units and interagency needs according to approved fire management plans, and local and national guidelines.

6. Manage fire qualification and training records in the Shared Applications Computer System (SACS), including: initial record input; updating fitness scores, training, experience, and issue incident qualification cards. The Fire Staff will provide an annual timetable to each unit fire coordinator for transferring the information to the Fire Program Assistant so that it can be input into the SACS.

7. Communicate with respective units on issues and concerns prior to representing the Ozark Fire Cluster at meetings, conferences, seminars and other functions as requested and required.

8. Coordinate National Park Service role in the interagency fire community; developing interagency agreements, cooperative agreements, and other agreements necessary for carrying out wildland fire management.

9. Prepare, review and return for approval prescribed fire plans developed for each park.

10. Assist with implementation of prescribed fire including providing staff and coordinating fire resources for project preparation and execution.

B. Responsibilities of the superintendents of the Ozark Fire Management Cluster include:

1. Make requests for assistance through the fire management office with sufficient lead-time to meet due dates and set-up meetings. Each unit superintendent will designate a unit fire coordinator who requests program assistance, budget, and training needs through the Fire Management Officer.

2. Submit fire experience and fire training records (using the EZ form), physical fitness scores, physical exam results (pass or fail), individual fire reports (DI-1202), availability reports, and situation reports, following established times and due dates. Unit fire coordinators will be responsible for maintaining fire readiness to the level identified in the park's fire management plan.

3. Notify the Fire Staff as soon as practical of any fire restrictions, closures, or fire occurrences.

4. Participate in the overall fire management of the Missouri, Iowa, Kansas and Illinois units of the National Park Service by committing to sharing of training and available personnel upon request.

5. The Chief Ranger of Ozark National Scenic Riverways will be the official supervisor of the Fire Management Officer (FMO). The other Superintendents will also work closely with the FMO and will provide input to the Ozark National Scenic Riverways' Chief Ranger for the FMO's performance appraisal.

ARTICLE III. WORK GROUP

The Fire Management Staff Officer will facilitate a Fire Management Work Group, which meets at least once a year to review budget inputs prior to submission, review the Interpark Agreement, and prioritize work plan activities. The Work Group will be composed of the Fire Coordinators fiom the park units covered by this Agreement and the fire staff for the Ozark Fire Management Cluster.

ARTICLE IV. FUNDING

Program costs (e.g. travel/per diem, communication, supplies and materials) incurred by the Fire Staff will be charged to FIREPRO accounts. In addition, any costs associated with the work group may be funded through FIREPRO accounts assigned to each park unit. If personnel are working on a project which has been individually funded, such as a prescribed fire, the overtime and travel costs for personnel may be paid fiom the appropriate project funds. The annual budget request will be reviewed and concurred with by the Work Group so that any supplemental requests, i.e.: physical exams, personal protective equipment, training, cache items, capital equipment, and hazard fuel reduction projects, are reflected in the annual budget request.

ARTICLE V. LOCATION OF THE FIRE STAFF

While it needs to be clear that the fire staff serves all eight parks, they will be located at Ozark National Scenic Riverways.

ARTICLE VI. TERM OF AGREEMENT

The term of this Agreement will be 5 years, beginning in fiscal year 2003. It is renewable at the end of each five-year period by written letter of agreement signed by each of the superintendents of the Ozark Fire Management Cluster.

This agreement will be reevaluated yearly between the parks and the fire management staff at the annual program review and evaulation.

Amendments to this Agreement can be made at any time subject to the written concurrence

and approval of all superintendents. Participating parks may withdraw from this agreement at anytime by formally notifying the Ozark National Scenic Riverways Superintendent.

This agreement does not make any commitments by any of the parks concerning structure, assignment or designation of positions within the Ozark Fire Management Cluster. That restructuring process will continue to evolve as a separate process and is not bound by this agreement.

Superintendent
Effigy Mounds National Monument — Date June 23, 2003

Superintendent
Fort Lamed National Historic Site — Date 6/26/03

Superintendent
Fort Scott National Historic Site — Date 9/8/03

Superintendent
George Washington Carver National Monument — Date July 9, 2003

Superintendent
Harry S Truman National Historic Site — Date 7/28/2003

Superintendent
Herbert Hoover National Historic Site — Date 8/4/03

Superintendent
Jefferson National Expansion Memorial
& Ulysses S. Grant National Historic Site — Date 7/31/03

Acting Superintendent
Wilson's Creek National Battlefield — Date July 21, 2003

Superintendent
Ozark National Scenic Riverways

Date 9/5/03

Z:\agreements\agreement-Interpark-2003.doc

Sample Delegation of Authority

Wilson's Creek National Battlefield
Republic, MO

Limited Delegation of Authority

As of 1800, November 20, 2001, I have delegated authority to manage the East Side 1 fire, number 0102, Wilson's Creek National Battlefield, to Incident Commander, John Doe and his Incident Management Team.

The fire which originated as an arson fire on November 19, 2001, is burning in habitat adjacent to the Battlefield boundary. My considerations for management of this fire are:

1. Provide for firefighter safety.

2. I would like the fire managed in such a manner that suppression actions will cause little environmental damage as possible.

3. Key features requiring priority protection are: adjacent private lands, historic structures, and NPS infrastructure.

4. Key resource considerations are: protecting glades containing the endangered Missouri Bladderpod.

5. Restrictions for suppression actions are no tracked vehicles will be utilized.

6. Minimum tools for use are Type II/III helicopters, and chainsaws.

7. My agency advisor will be Chief of Resource Management, Gary Sullivan.

8. Managing the fire cost-effectively for the values at risk is a significant concern.

9. Providing training opportunities for Battlefield personnel is requested to strengthen our organizational capabilities.

Superintendent, Wilson's Creek National Battlefield
November 20, 2001

APPENDIX F

F. WILDLAND AND PRESCRIBED FIRE MONITORING PLAN

In development.

APPENDIX G

G. PRE-ATTACK PLAN

Function/Item	Available	Needed	Not Needed
Command			
Pre-attack WFSA			
Pre-positioning Needs			
Draft Delegation of Authority			
Management Constraints			
Interagency Agreements			
Evacuation Procedures			
Structural Protection Needs			
Closure Procedures			
Operations			
Water Sources			
Control Line Locations			
Natural Barriers			
Safety Zones			
Flight Routes/Restrictions			
Staging Area Locations			
Helispot/Helibase Locations			
Logistics			
ICP Location			
Roads/Trails with Limitations			
Utilities			
Medical Facilities			
Stores/Restaurants/Services			
Rental Equipment Sources			
Construction Contractors			
Sanitary Facilities			
Law Enforcement/Fire Departments			
Communications (availability)			
Maintenance Facilities			
Sanitary Landfills			
Planning			
Park Base Map			
Area Topographic Maps			
Infrared Imagery			
Vegetation/Fuel Maps			
Hazard Maps (ground and aerial)			
Special Visitor Use Areas			
Land Ownership Status			
Archeological/Cultural Resource Maps			
Sensitive Plant Area Maps			

APPENDIX H

H. STEP-UP PLAN

Staffing Class	Fuel Model	Burning Index	Step up Actions
SC-1	N	0-8	Normal tours of duty are scheduled. Fire preparations during this stage will entail inventory and servicing of all fire equipment vehicles and supplies. The fire call-up roster, found in appendix e, will be confirmed and distributed to key employees. All qualified initial attack firefighters will be outfitted with personal protective equipment. A coordinator will be sent to assist the responding fire department
SC-2	N	9-17	Same as SC-1.
SC-3	N	18-34	Same as SC-2 plus. All scheduled work duties and visitor activities will continue as normal, but fire packs and personal equipment for fire qualified employees will be kept near at hand in offices or vehicles. Visitor center personnel will inform visitors of fire danger levels. Road patrols will be increased. All park staff will be made aware of fire danger levels.
SC-4	N	35-38	Actions in SC-3 plus. At this stage of fire danger, precautionary signs may be posted and/or fire prevention materials given to visitors. Unit fire personnel may be notified they are on-call, and overtime (personnel may work days off) may be authorized to provide necessary patrols and preparedness needs. Additional patrols will be made. The FMO will contact the Midwest regional FMO. If deemed necessary, extend coverage of initial attack personnel to 12 hour work days, using emergency preparedness funds for overtime incurred. Smoking maybe restricted to private vehicles.

SC-5	N	39+	Actions in SC-4 plus. Contacts will be made with fire fighting units of cooperators and the radio communication net between organizations will be monitored. Superintendent may issue closure notice. Open fires and smoking will be prohibited. Trailheads will be posted with fire danger or closure warning signs.

APPENDIX I

I. LONG-TERM PRESCRIBED FIRE AND HAZARD REDUCTION PLAN

Treatment needs are based upon a review of all fire management units by the fire management officer at Ozark Scenic Riverways, resource management specialist at Wilson's Creek National Battlefield, and the Heartland Inventory and Monitoring Coordinator. Treatments have also been discussed with ecologists writing the cultural landscape report (CLR) for Wilson's Creek. The following treatments are consistent with the draft CLR but are slightly less aggressive. Five different treatments have been outlined.

Re-established Warm Season Grass Units in Trouble (i.e. invaded by woody plants). These areas have a well established matrix of warm season grasses that provide fine fuels for sustaining prescribed burns. They are "in trouble" because they are heavily invaded with woody plants and exotic species. These units can be maintained by the following methods.

> **Prescribed Fire:** Burn every 2 years. Fall burns will be given priority.
> **Hazard Fuel Reduction:** Mow selected areas by July 15th to maintain a low density of woody brush. Before each burn cut selected trees (i.e. cedars) and provide protection to historic trees and small oaks.
> **Exotics Control:** Control exotics each year, the priority is Sericea lespedezea. Spot treatment using chemicals should be used in areas of recent exotic invasion where success is probable. Mechanical treatment, mowing at flowering stage, should be used in areas of wide exotic dispersal. Most of these units fall into this category.

Unit SW-1 and SW-2. These are areas that don't have a well established matrix of warm season grasses. They are either heavily wooded or are old field pastures. The old fields are infested with honey locust (Gleditsia tricanthos) and tall fescue. The wooded areas either have heavy fuel accumulations of downed timber from the May 2003 tornado or a sparse understory that is difficult to burn. These units can be maintained by the following methods.

> **Prescribed Fire:** Burn every 2 years. Fall burns will be given priority.
> **Hazard Fuel Reduction:** Establish control lines along trails and fencelines in the unit. Mechanically salvage downed timber throughout the unit. Provide protection to resources (i.e. historic trees, archeological sites, stone fences). Before each burn cut selected trees (i.e. cedars) and provide protection to significant resources.
> **Exotics Control:** Control exotics each year, the priority is honey locust (Gleditsia tricanthos). Trees should be removed with a hydroax or brush hog followed by burning and chemical spot treatment of re-sprouts.

Manley Woodland Units. These are areas that are: heavily wooded and have heavy fuel accumulations of downed timber from the May 2003 tornado; are old field pastures infested with honey locust (Gleditsia tricanthos), tall fescue, and eastern juniper; have small areas that have a well established matrix of warm season grasses that are heavily invaded with brush. These units can be maintained by the following methods.

> **Prescribed Fire:** Burn every 2 years. Fall burns will be given priority.
> **Hazard Fuel Reduction:** Establish control lines along trails, roads, and fencelines in the unit. Mechanically salvage downed timber throughout the unit. Provide protection to resources (i.e. historic trees, archeological sites, cemetery). Before each burn cut selected trees (i.e. cedars) and provide protection to significant resources.

Exotics Control: Exotics have never been a problem in these units in the past, however, with the major disturbance created by the tornado the situation should be closely monitored.

Re-established Warm Season Grass Units in Stable Condition (NW-1, NW-2, NW-3, NW-4, NE-5). These are areas that are fairly easy to manage because of the lack of woody plants and exotic species and the well established matrix of warm season grasses that provide fine fuels for sustaining maintenance burns. These units can easily be maintained by the following methods.

Prescribed Fire: Burn every 3 years. Fall burns will be given priority.
Hazard Fuel Reduction: Mow selected areas by July 15th to maintain a low density of woody brush.
Exotics Control: Control exotics each year, the priority is Sericea lespedezea. Spot treatment using chemicals should be used in areas of recent exotic invasion where success is probable (i.e. all units).

Glade Units (Bloody Hill, North Bloody Hill, Walnut, and Wire Road). These xeric areas have very thin soils, are heavily infested with junipers and other woody plants, and either have a well established but thin covering of warm season grasses or a covering of exotic grasses. These units can be maintained by the following methods.

Glades with Missouri bladderpod (Lesquerella filliformis)
Prescribed Fire: Burn every 5 years before the fall germination of Lesquerella filiformis. In a typical year this is in the late summer or early fall (last two weeks in September).
Hazard Fuel Reduction: Mechanically remove every third cedar outside of the Lesquerella filiformis growing season, typically from June 15 to September 30. The cedars should be removed from Lesquerella filliformis habitat and chipped or burned. Seed native grasses and forbs on Walnut glade if necessary to provide fine fuels for sustaining future burns.
Exotics Control: Control exotics each year, the priority is annual brome. Brome grasses should be mechanically controlled by cutting the seed heads off the plant at the dough stage, typically from April 15 – 30.

Glades without Missouri bladderpod (Lesquerella filliformis)
Prescribed Fire: Burn to match the frequency of surrounding units. Burn cured cedar piles.
Hazard Fuel Reduction: Mechanically remove every third cedar and stack under other cedars. Seed native grasses and forbs if necessary to provide fine fuels for sustaining future burns.
Exotics Control: Control exotics each year, the priority is Sericea lespedezea. Spot treatment using chemicals should be used in areas of recent exotic invasion where success is probable. Mechanical treatment, mowing at flowering stage, should be used in areas of wide exotic dispersal.

1. Multi-year prescribed fire schedule

Wilson's Creek National Battlefield
Prescribed Fire Project Proposed Schedule

Year	Acreage	Season
2005	823.2	Fall or Spring
2006	647	Fall or Spring Glades in the Summer
2007	654.6	Fall or Spring
2008	629	Fall or Spring
2009	589.8	Fall or Spring Glade in the Summer
2010	731.8	Fall or Spring Glades in the Summer
2011	569.8	Fall or Spring Glade in the Summer
2012	629	Fall or Spring

2. Multi-year mechanical fuels project schedule

Wilson's Creek National Battlefield
Mechanical Fuels Project Proposed Schedule

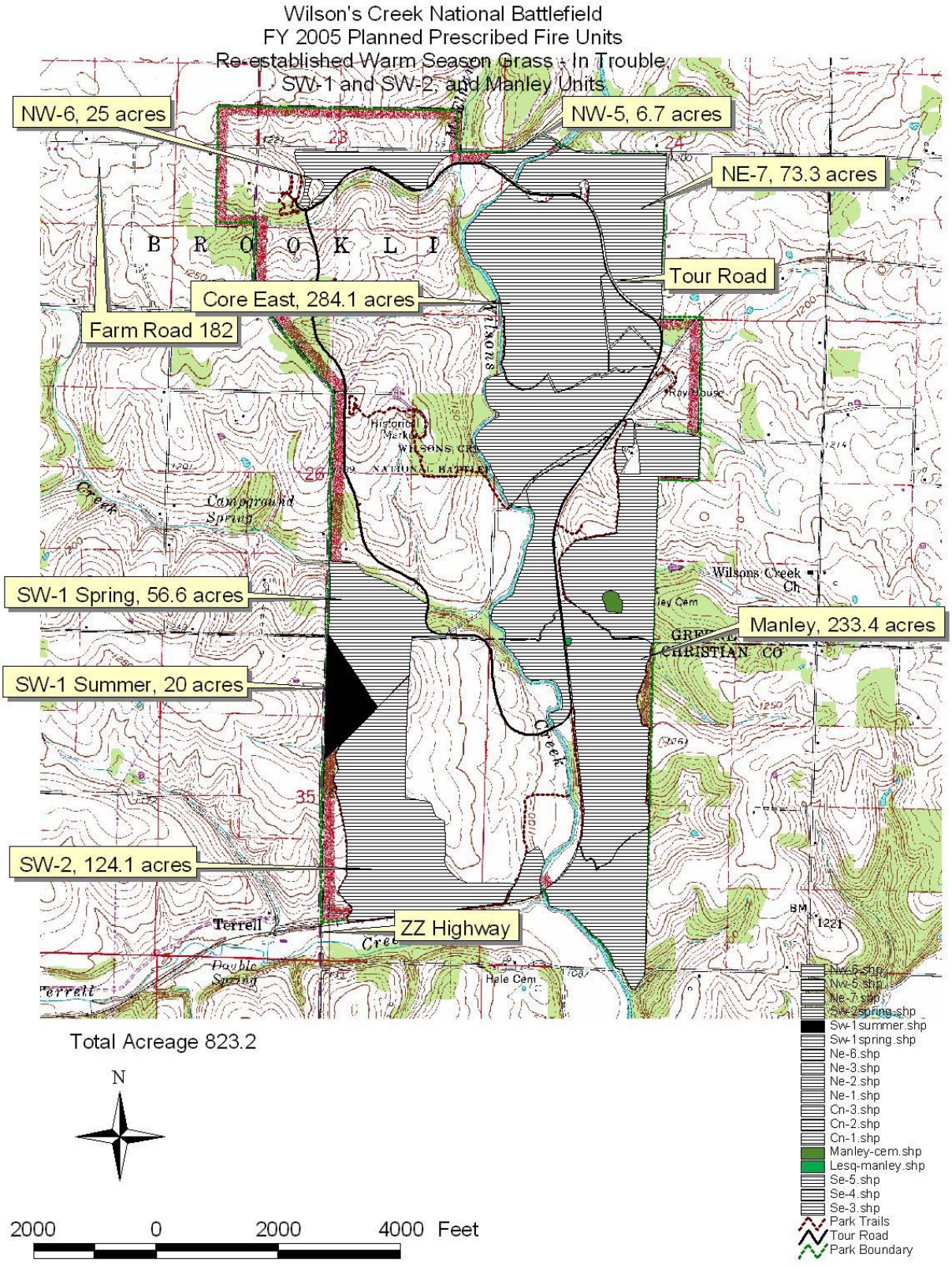
Year	Treatment	Acreage
2005	Juniper Thinning	16
2005	Fire Line Clearing	65
2005	Clearing Near Trails	7
2005	Salvage Contract	128
2006	Juniper Thinning	16
2007	Juniper Thinning	16
2008	Juniper Thinning	16

2009	Juniper Thinning	16
2010	Juniper Thinning	16
2011	Juniper Thinning	16
2012	Juniper Thinning	16

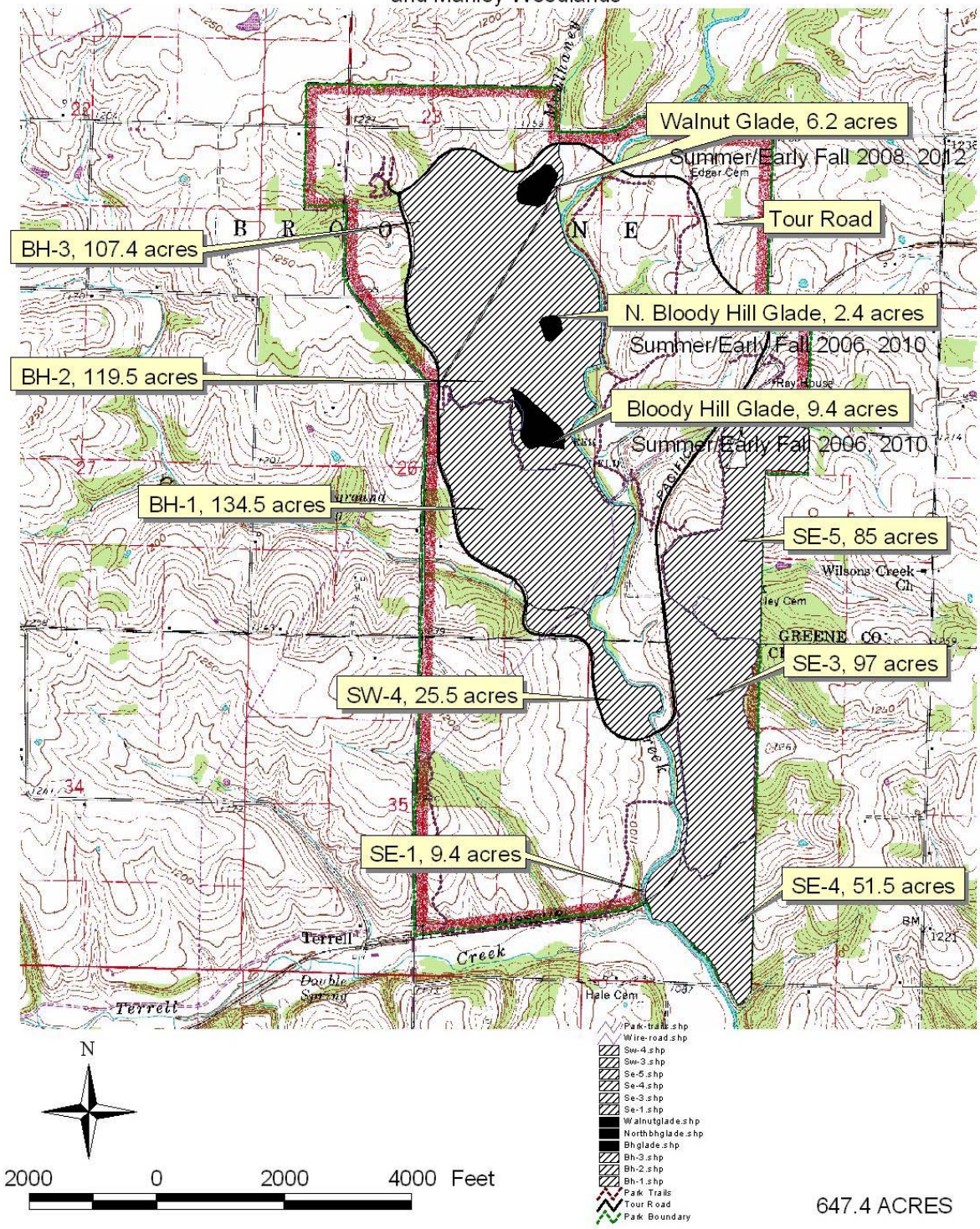
3. Multi-year exotic species project schedule

Wilson's Creek National Battlefield
Chemical Fuels Project Proposed Schedule

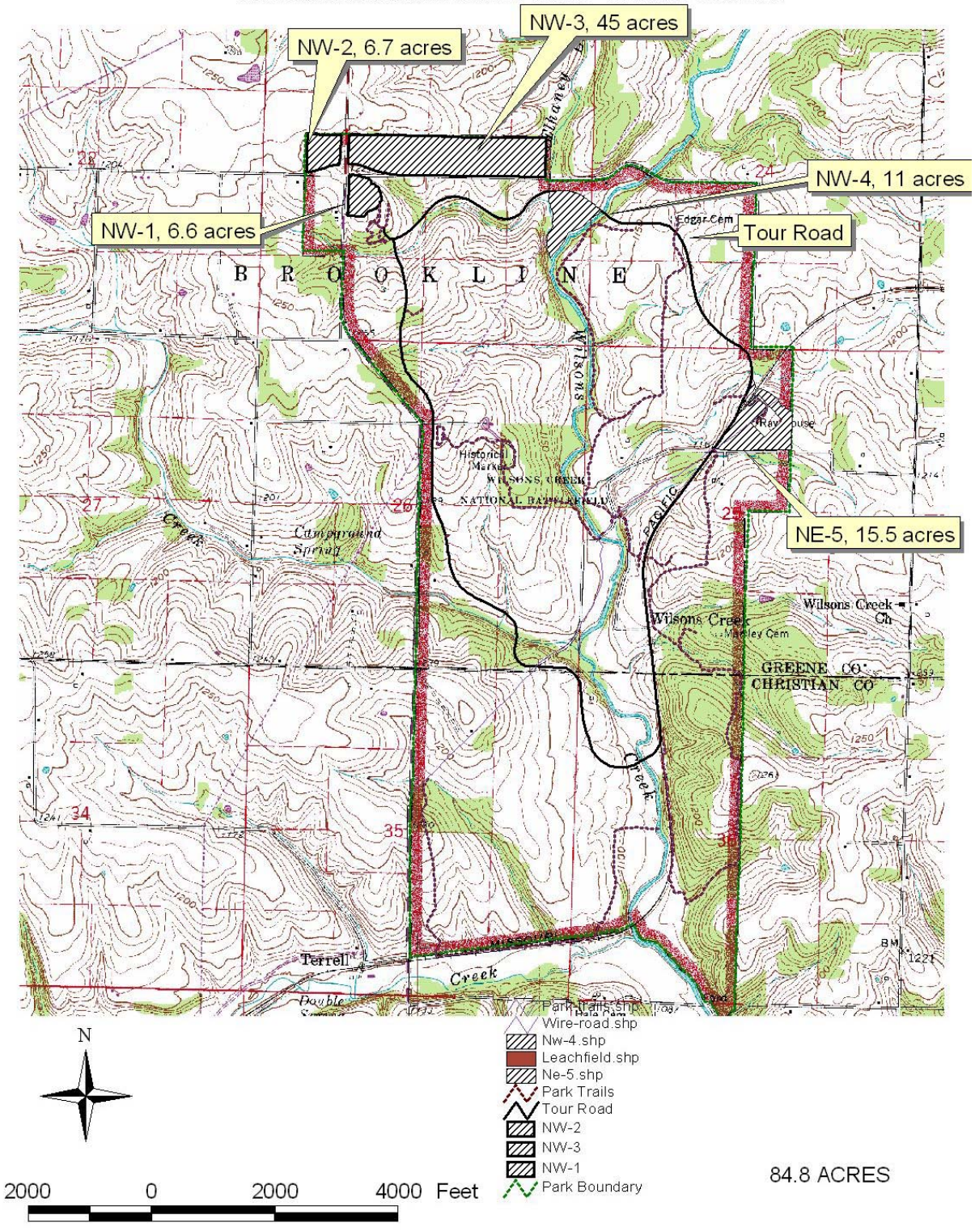
Year	Target Species	Treatment	Acreage
Every Year	Serica Lespedeza	Mechanical	600
Every Year	Serica Lespedeza	Chemical	10
Every Year	Annual Brome Grasses on Glades	Mechanical	20
Every Year	Gleditsia tricanthos	Mechanical	10
Every Year	Gleditsia tricanthos	Chemical	10


Wilson's Creek National Battlefield
FY 2005 Planned Prescribed Fire Units
Re-established Warm Season Grass - In Trouble
SW-1 and SW-2, and Manley Units
NW-6, 25 acres
NW-5, 6.7 acres
NE-7, 73.3 acres
Tour Road
Core East, 284.1 acres
Farm Road 182
SW-1 Spring, 56.6 acres
SW-1 Summer, 20 acres
Manley, 233.4 acres
SW-2, 124.1 acres
ZZ Highway
B R O O K L I
Total Acreage 823.2
N
2000 0 2000 4000 Feet
Nw-6.shp
Nw-5.shp
Ne-7.shp
Sw-2spring.shp
Sw-1summer.shp
Sw-1spring.shp
Ne-6.shp
Ne-3.shp
Ne-2.shp
Ne-1.shp
Cn-3.shp
Cn-2.shp
Cn-1.shp
Manley-cem.shp
Lesq-manley.shp
Se-5.shp
Se-4.shp
Se-3.shp
Park Trails
Tour Road
Park Boundary

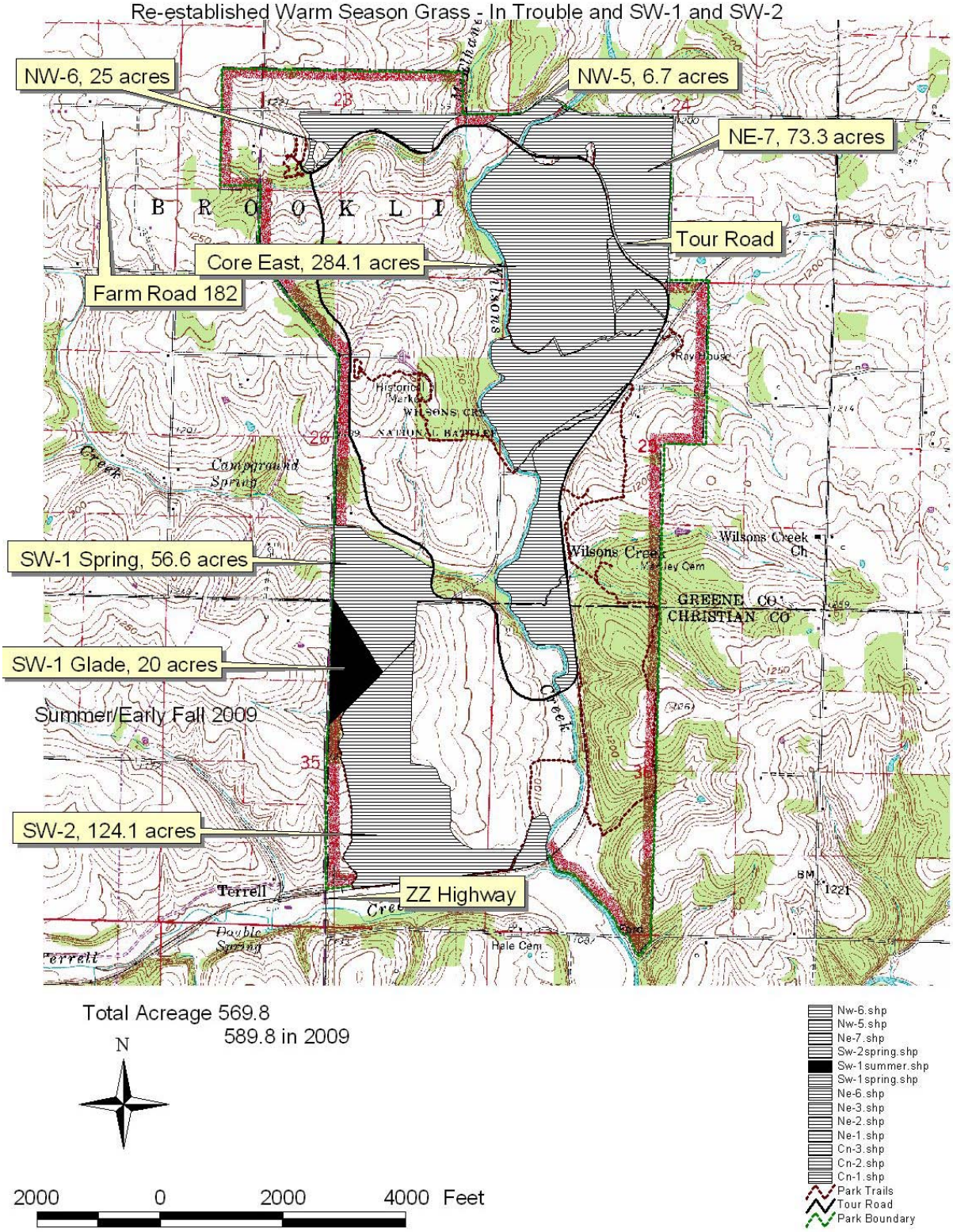
Wilson's Creek National Battlefield
FY 2006, 2008, 2010, 2012 Planned Prescribed Fire Units
Re-established Warm Season Grass - In Trouble
and Manley Woodlands

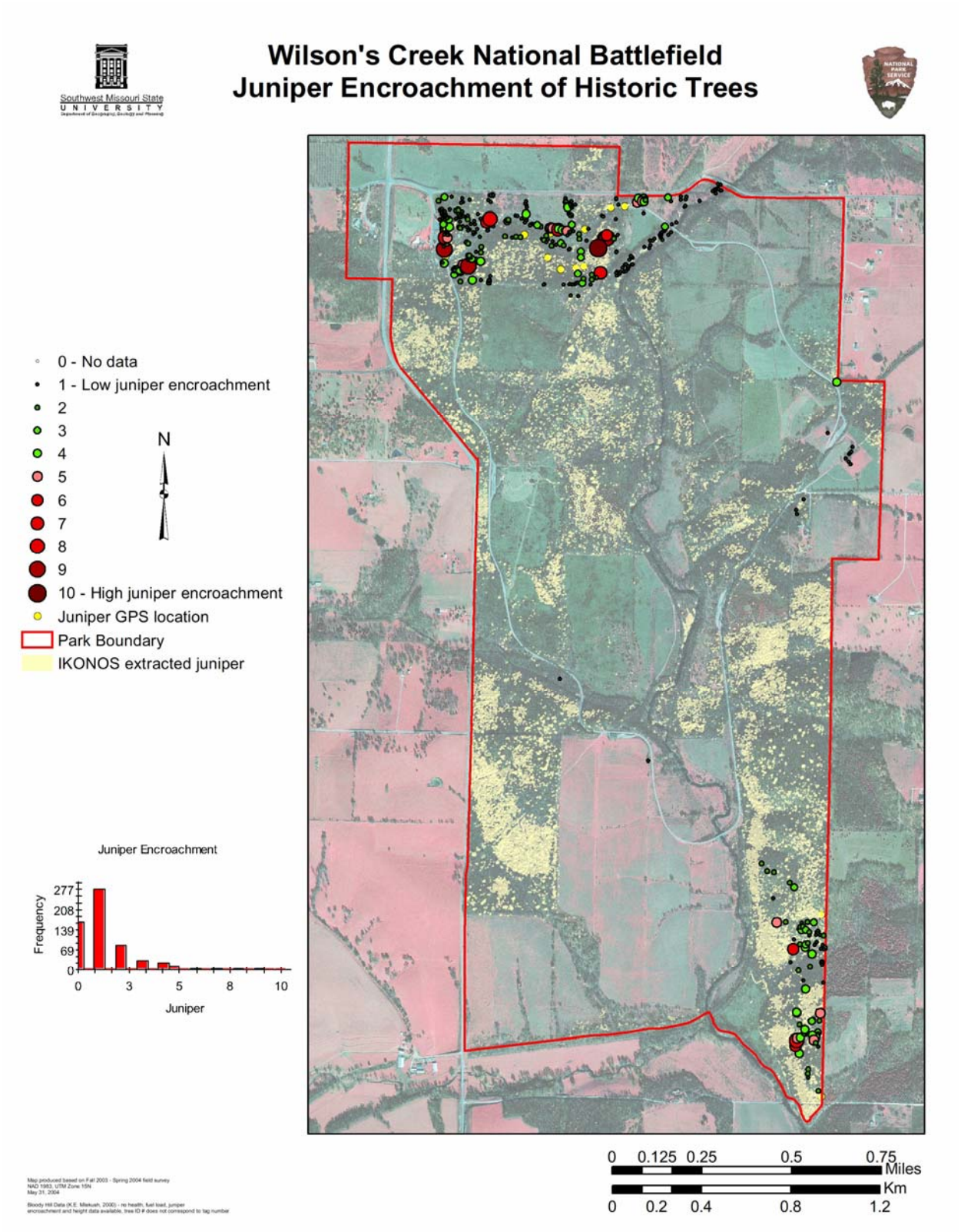


Wilson's Creek National Battlefield
FY 2007 and 2010 Planned Prescribed Fire Units
Re-established Warm Season Grass - In Stable Condition

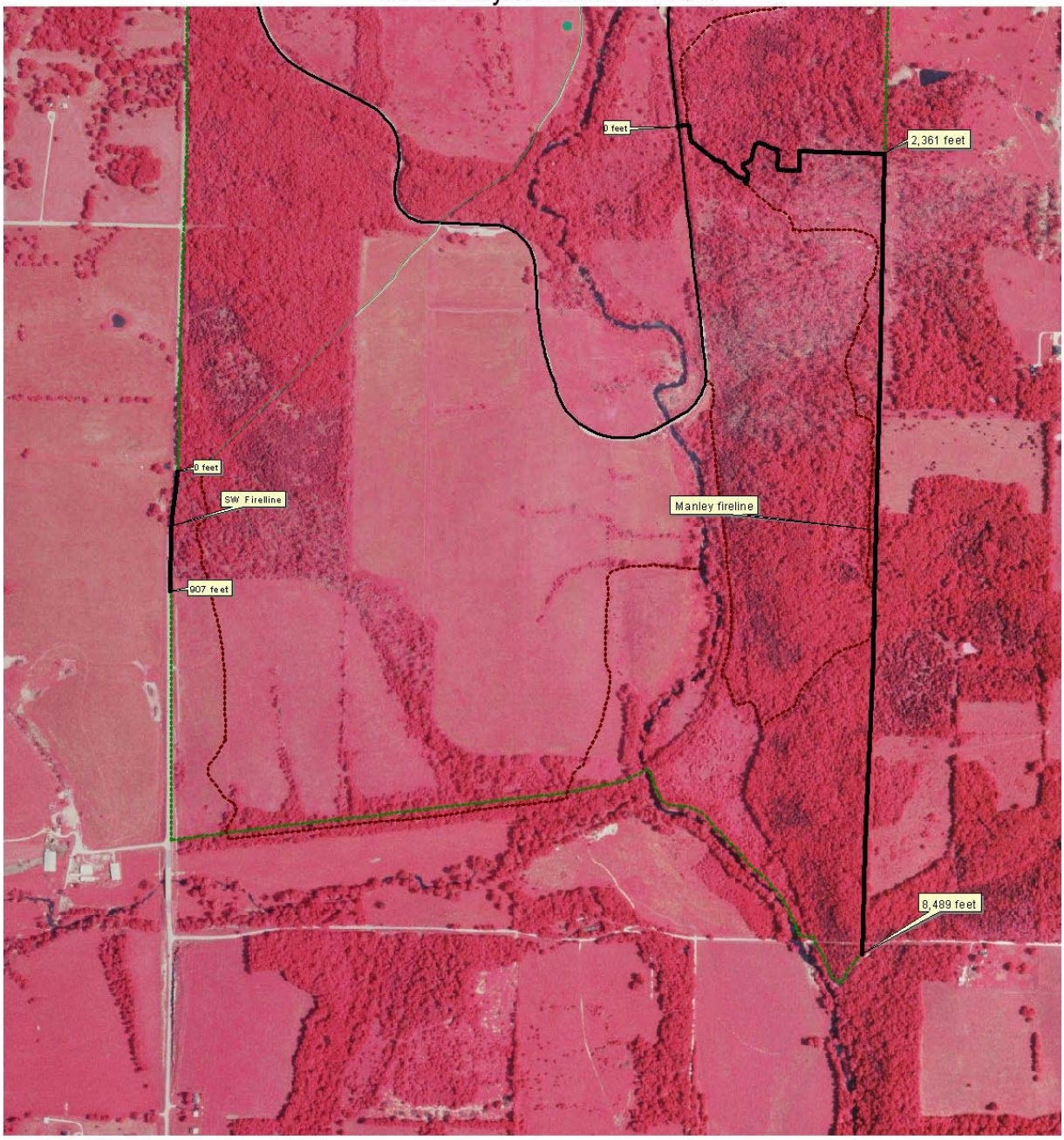


Wilson's Creek National Battlefield
FY 2007, 2009, and 2011 Planned Prescribed Fire Units
Re-established Warm Season Grass - In Trouble and SW-1 and SW-2




Southwest Missouri State University
Wilson's Creek National Battlefield
Juniper Encroachment of Historic Trees
0 - No data
1 - Low juniper encroachment
2
3
4
5
6
7
8
9
10 - High juniper encroachment
Juniper GPS location
Park Boundary
IKONOS extracted juniper
N
Juniper Encroachment
Frequency
277
208
139
69
0
0
3
5
8
10
Juniper
0 0.125 0.25 0.5 0.75 Miles
0 0.2 0.4 0.8 1.2 Km

Wilson's Creek National Battlefield
Hazardous Fuel Reduction, Fireline Clearing
Base Layer 2003 DOQQ



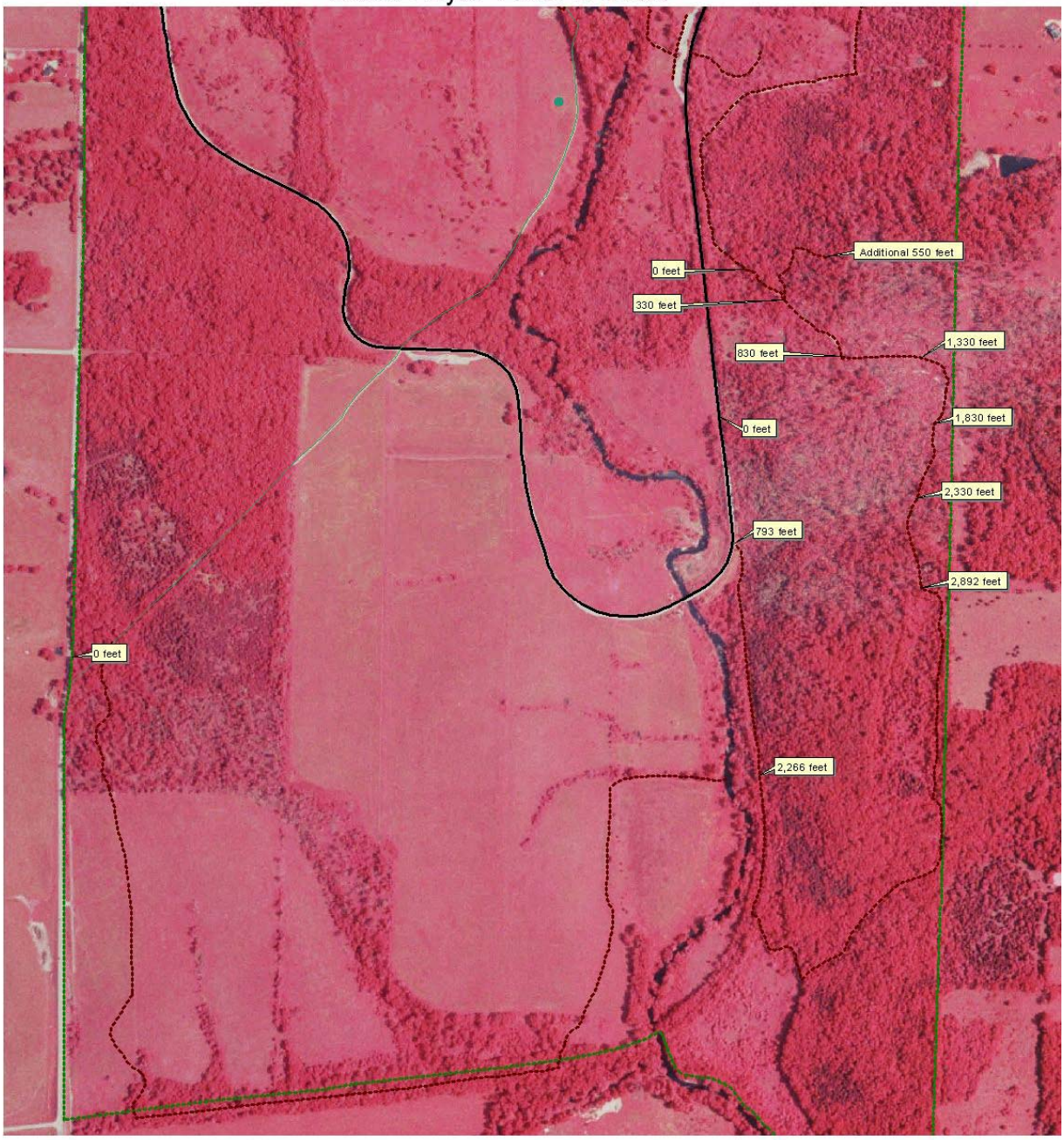
Approximately 8,489 feet of fireline needs cleared.

N

1000 0 1000 2000 Feet

Sw fireline.shp
Manley fireline.shp
Wire-road.shp
Building#.shp
Park Trails
Tour Road
Park Boundary

Wilson's Creek National Battlefield
Hazardous Fuel Reduction Near Trails
Base Layer 2003 DOQQ



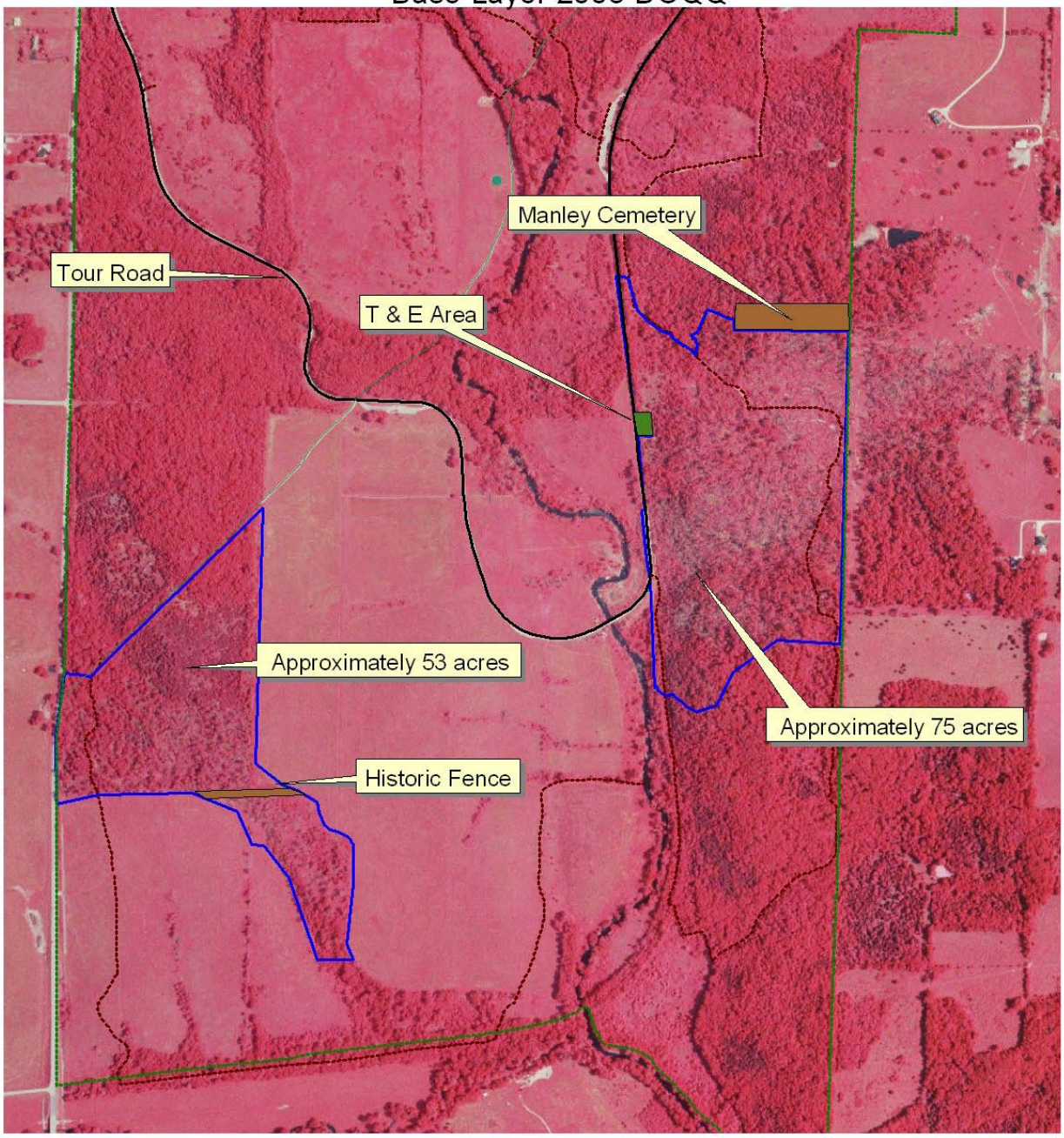
Approximately 5,708 feet of fireline needs cleared.

N

1000 0 1000 2000 Feet

Wire-road.shp
Building#.shp
Park Trails
Tour Road
Park Boundary

Wilson's Creek National Battlefield
Hazardous Fuel Reduction, Salvage Contract
Base Layer 2003 DOQQ



Salvage Contract Areas are Approximately 128 Acres

N

1000 0 1000 2000 Feet

Rare Species Site
Historic Site
Wire Road
Building Numbers
Tour Road
Park Boundary
Salvage Contract Areas
Park Trails

APPENDIX J

J. FIRE PREVENTION PLAN FOR WILSON'S CREEK NATIONAL BATTLEFIELD

Objectives

1. To reduce the threat of human caused fires through visitor and employee education.
2. To integrate the prevention message into interpretive programs.

General Actions

All members of the staff located at Wilson's Creek National Battlefield will be familiar with this plan and be able to explain it to other interested parties.

During the fire season fire prevention will be discussed at each park safety meeting.

Smoking will be prohibited on all park trails when fire danger is very high or extreme. Signs will be placed to notify the public at all entrances and trailheads.

Interpretive programs will include fire prevention messages to alert the visitors concerning current fire conditions.

Fire Prevention Analysis

The fire prevention analysis is attached to this plan as an appendix. This appendix contains the detailed prevention actions identified for specific areas or fire problems in the park. It will be reviewed annually and updated if changes occur which alter the identified RISKS, HAZARDS, or VALUES.

EVALUATION

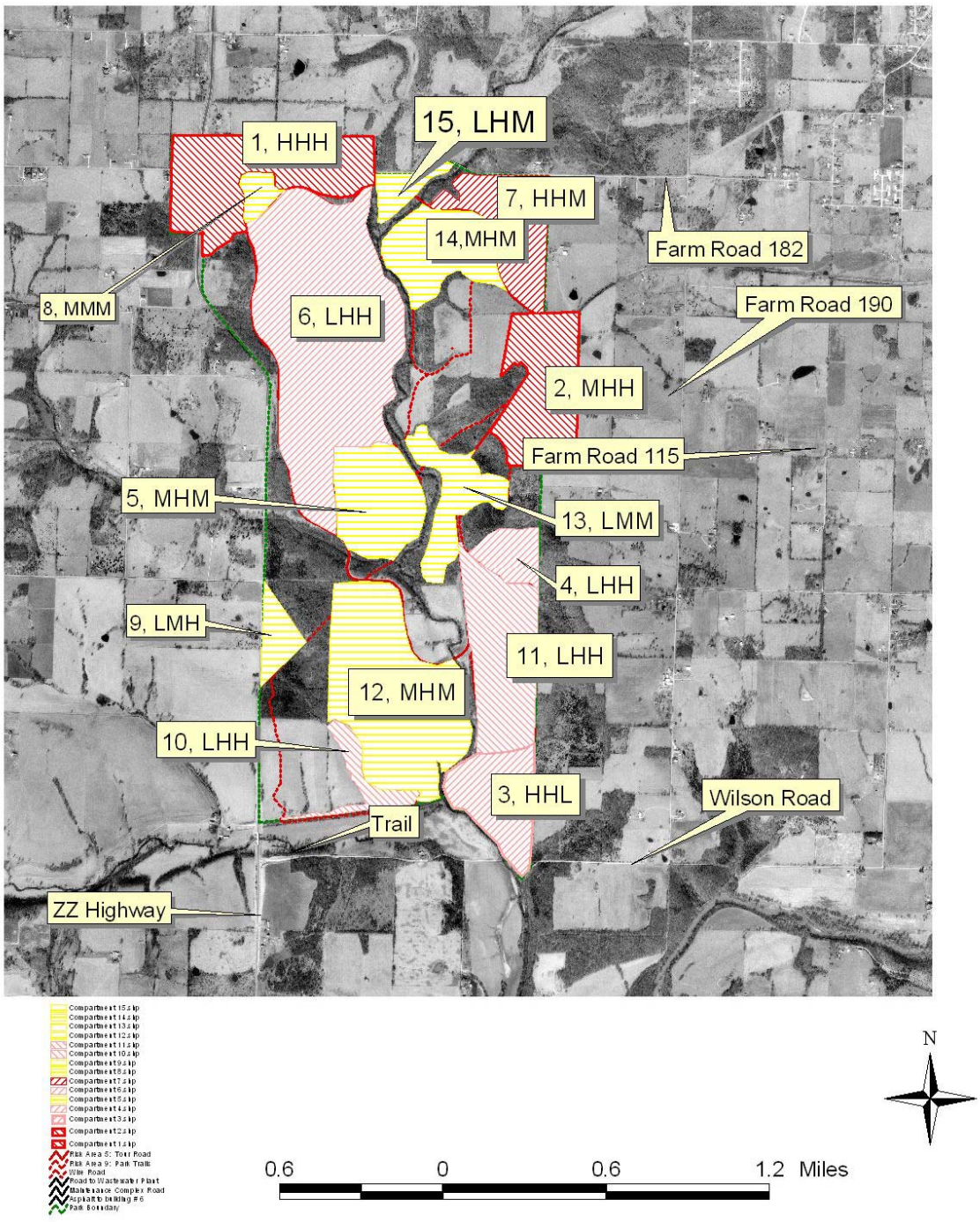
The fire prevention plan should be reviewed annually as stated in the prevention chapter. If human caused ignitions are occurring in new areas or increasing in identified priority areas, it may be time to change the prevention strategy. The evaluation should concentrate on areas where specific problems are occurring rather than changing the entire plan. If the plan is working, there is no need to make changes.

As new trails or recreational sites are developed or use and values change, the plan must be reviewed to determine if new actions are required, and the decisions made will be documented in that year's prevention plan.

FIRE COMPARTMENTS

Fire risk compartments were identified after a fire risk analysis was completed for the park. Detailed information on this analysis follows a description of each risk compartment and recommended prevention prescriptions.

Fire Prevention Plan Compartment Map
Wilson's Creek National Battlefield



Compartment 1, HHH: This area is near the visitor center and maintenance complex and has a high risk for ignitions due to the heavily used transportation corridor and visitor use areas, a high concentration of hazardous fuels, and a large number of high value buildings.

Responsible division: Resources and Facility Management: Prevention actions should include 12 foot control lines adjacent to roads and adjacent to the Sweeny property during periods of high fire danger. Control lines around the visitor center and maintenance complex should be 50 foot through the summer months and 100 foot in the fall, winter, and early spring months. During prescribed burns an engine should be stationed near the propane tanks for additional protection. Daily patrols should be implemented in times of high fire danger.

Responsible division: Visitor Services and Law Enforcement: Prevention actions should include making visitor contacts and providing fire safety information to visitors during prescribed burns and high fire danger periods.

Compartment 2, MHH: This area is near the Ray House and springhouse and has a moderate risk due to occasional fire use (campfires, and black powder); a high concentration of hazardous fuels, and the two most important historic structures in the park.

Responsible division: Resources and Facility Management: Prevention actions should include 12 foot control lines around the springhouse throughout the year, 50 control lines around the Ray house through the summer months, and 100 foot control lines around the Ray house in the fall, winter, and early spring months. During prescribed burns the structure should be foamed and an engine left in the area until the fire is no longer a threat. Daily patrols should be implemented in times of high fire danger.

Responsible division: Visitor Services and Law Enforcement: Prevention actions should include making visitor contacts and providing fire safety information to visitors during prescribed burns and high fire danger periods.

Compartment 3, HHL: This area is at the extreme south end of the park and has a high risk for ignitions due to the un-authorized use of fire during parties, and a high concentration of fuels nearby. The area has a low value due to the absence of improvements in this area.

Responsible division: Resources and Facility Management: Prevention actions should include patrols throughout the fire season.

Responsible division: Visitor Services and Law Enforcement: Prevention actions should include law enforcement contacts to prevent the use of bonfires.

Compartment 4, LHH: This area surrounds the Manley cemetery. The area has a low risk of ignition and a concentration of highly flammable fuels (slash) due to the tornado damage. The area also has a high value because it contains the historic Manley cemetery.

Responsible division: Resources and Facility Management: Prevention actions should include removing fuels from the cemetery (mowing), establishing and maintaining a 10 foot fire line around the cemetery, and conducting daily patrols during high fire danger periods.

Compartment 5, MHM: This area surrounds the Edwards cabin. The area has a moderate risk of ignition due to a contract underway to re-habilitate the cabin. The area has a concentration of highly flammable fuels and a structure that is of moderate value at this time. When the re-habilitation of the Edwards cabin is complete the value assigned should be re-evaluated.

Responsible division: Resources and Facility Management: Prevention actions should include establishing and maintaining 50 control lines around the cabin through the summer months and 100 foot control lines around the cabin in the fall, winter, and early spring months. During prescribed burns the structure should be foamed and an engine left in the area until the fire is no longer a threat. Daily patrols should be implemented in times of high fire danger.

Responsible division: Visitor Services and Law Enforcement: Prevention actions should include making visitor contacts and providing fire safety information to visitors during prescribed burns and high fire danger periods.

Compartment 6, LHH: This area includes the Bloody Hill trail loop, the Lyon marker, several glades with threatened plant species, and a cave. The area has a low risk of ignition, a concentration of highly flammable fuels, and high value resources (Lyon marker, sinkhole, threatened species, cave).

Responsible division: Resources and Facility Management: Prevention actions should include mowing control lines along the tour road and conducting daily patrols during times of high fire danger.

Responsible division: Visitor Services and Law Enforcement: Prevention actions should include making visitor contacts and providing fire safety information to visitors during prescribed burns and high fire danger periods.

Compartment 7, HHM: This area surrounds the Edgar cemetery. The area has a high risk of ignition because it is adjacent to a heavily used transportation corridor. The area also has a concentration of highly flammable fuels, and a moderate value due to the presence of the Edgar cemetery.

Responsible division: Resources and Facility Management: Prevention actions should include keeping the Edgar cemetery mowed year round, establishing and maintaining an 8 foot mowed area along the boundary fence during the fire season, and conducting daily patrols during times of high fire danger.

Compartment 8, MMM: This area surrounds the old waste water treatment plant. The area has a moderate risk for ignition due to the occasional use of the structure as a metal shop. The area has moderate fuels, and the structures are of moderate value.

Responsible division: Resources and Facility Management: The old treatment plant is a concrete building therefore very little prevention action is necessary. The building should be mowed around to prevent fuels buildup.

Compartment 9, LMH: This area contains a glade with a threatened plant species. The area has a low risk for ignition, moderate fuels, and a high resource value.

Responsible division: Resources and Facility Management: Prescribed burns should only be conducted in this area between the months of July and October. The critical months for preventing wildfire is November through June because the plant is growing at that time. Prevention activities should include maintaining a control line along the north eastern edge and daily patrolling during times of high fire danger.

Compartment 10, LHH: This area surrounds a cave and a stone fence. The area has a low risk for ignition, a concentration of highly flammable fuels, and a high resource value.

Responsible division: Resources and Facility Management: Prescribed burn preparation activities should protect the stone fence and the cave opening. Prevention activities should include maintaining a control line around the stone fence and cave and daily patrolling during times of high fire danger.

Compartment 11, LHH: This is the Manley Uplands area which has a low risk of ignition, a concentration of highly flammable fuels (tornado slash), and a high resource value.

Responsible division: Resources and Facility Management: The small area that contains the threatened species should only be burned between the months of July and October. The critical months for preventing wildfire is November through June because the plant is growing at that time. Because the eastern boundary of this unit has continuous fuels a wildfire will be extremely difficult to suppress. Prevention activities should include aggressive patrols during periods of high fire danger, fire line clearing on the eastern boundary, and a reduction of hazardous fuels throughout the unit.

Compartment 12, MHM: This area surrounds stop 5 on the tour road. The area is of moderate risk for ignitions due to occasional fire use (campfires, and black powder), a

high concentration of hazardous fuels, and medium value. The only structures in this area are interpretive signs, cannons, and benches.

Responsible division: Resources and Facility Management: Fire prevention activities should include mowing 50 foot control lines around the improvements throughout the year.

Responsible division: Visitor Services and Law Enforcement: Prevention actions should include making visitor contacts and providing fire safety information to visitors during prescribed burns and high fire danger periods.

Compartment 13, LMM: This area includes interpretive waysides at Pulaski battery. The area is of low risk for ignition, has moderate fuels, and has moderate resource values. Structures to protect include the Pulaski overlook boardwalk, footbridges, interpretive signs, and a cannon.

Responsible division: Resources and Facility Management: Fire prevention should include keeping control lines mowed around the boardwalk during the fire season and daily patrolling during high fire danger.

Responsible division: Visitor Services and Law Enforcement: Prevention actions should include making visitor contacts and providing fire safety information to visitors during prescribed burns and high fire danger periods.

Compartment 14, MHM: This area includes the Gibson Mill site. The area is a moderate ignition risk, contains highly flammable fuels, and has moderate valued resources. Most resources are in the woods near the creek and have a low potential for damage, however, footbridges the interpretive sign at the trail head require protection.

Responsible division: Resources and Facility Management: Prevention activities should include mowing control lines around the interpretive sign at the trail head and daily patrolling during times of high fire danger.

Responsible division: Visitor Services and Law Enforcement: Prevention actions should include making visitor contacts and providing fire safety information to visitors during prescribed burns and high fire danger periods.

Compartment 15, LHM: This area is directly under the KAMO power lines. The area has a low risk of ignition, highly flammable fuels, and moderate resource values. The vent tubes for the leach field that serves the park requires protection measures.

Responsible division: Resources and Facility Management: Prescribed burns should include mowing around and foaming these tubes. Fire prevention activities should include daily patrols during times of high fire danger.

FIRE PREVENTION ANALYSIS

RISKS

HIGH RISK AREAS = Common Ignition Sources. High use transportation corridors and areas of un-supervised fire use.

Risk Area 1: High Use Transportation.

Risk Area 2: Party Area with Occasional Fire Use.

MEDIUM = Occasional Ignition Sources. Black powder demonstration and storage areas, campsites with occasional fire use, and metal shops with ignition sources.

Risk Area 3: Black Powder Use Areas and Campsites with Occasional Fire Use.

Risk Area 4: Metal Shop with Cutting Torch and Welder.

LOW RISK AREAS = Low Visitor Use Areas. Areas of low visitor use, above ground power lines, and dead end roads with no recent fires.

Risk Area 5: Tour Road

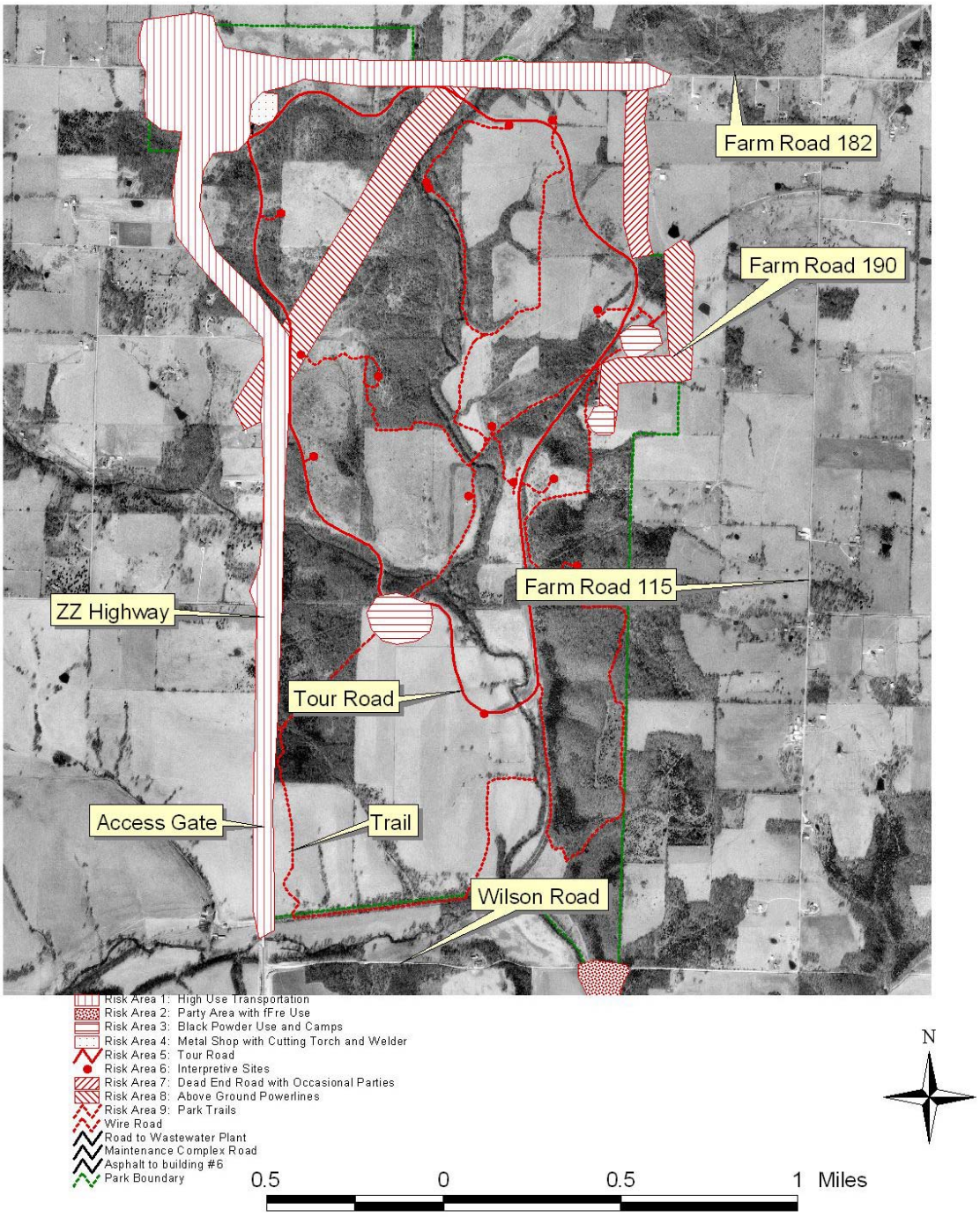
Risk Area 6: Interpretive Sites

Risk Area 7: Dead End Road with Occasional Parties

Risk Area 8: Above Ground Power Lines

Risk Area 9: Park Trails

Fire Prevention Plan Risk Map
Wilson's Creek National Battlefield



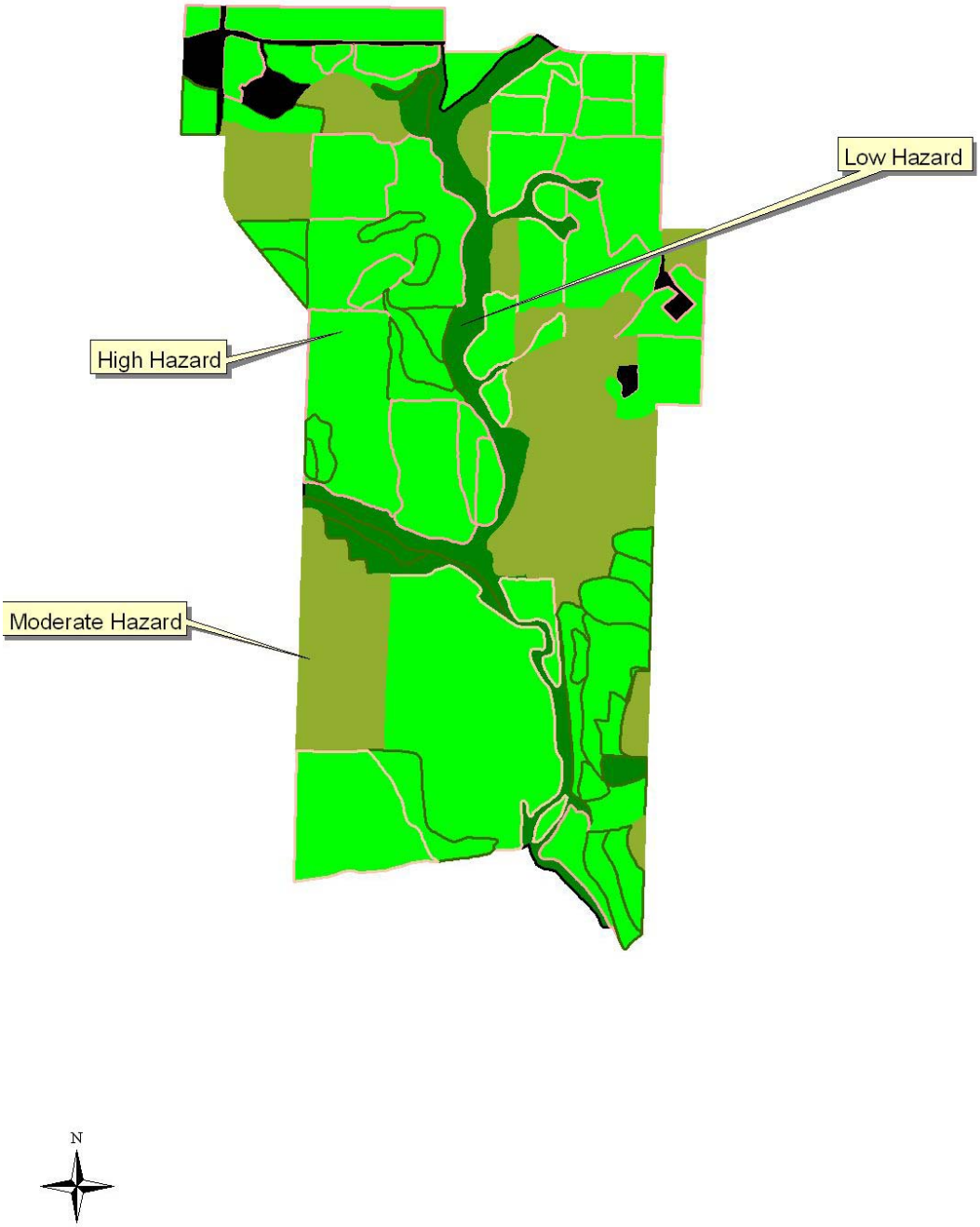
HAZARDS

HIGH HAZARD AREAS = Fuel model 3, grassland; Manley and SW-2 Slash

MEDIUM HAZARD AREAS = Fuel model 9, scrub

LOW HAZARD AREAS = Fuel model 8, timber

Fire Prevention Plan Hazards Map
Wilson's Creek National Battlefield



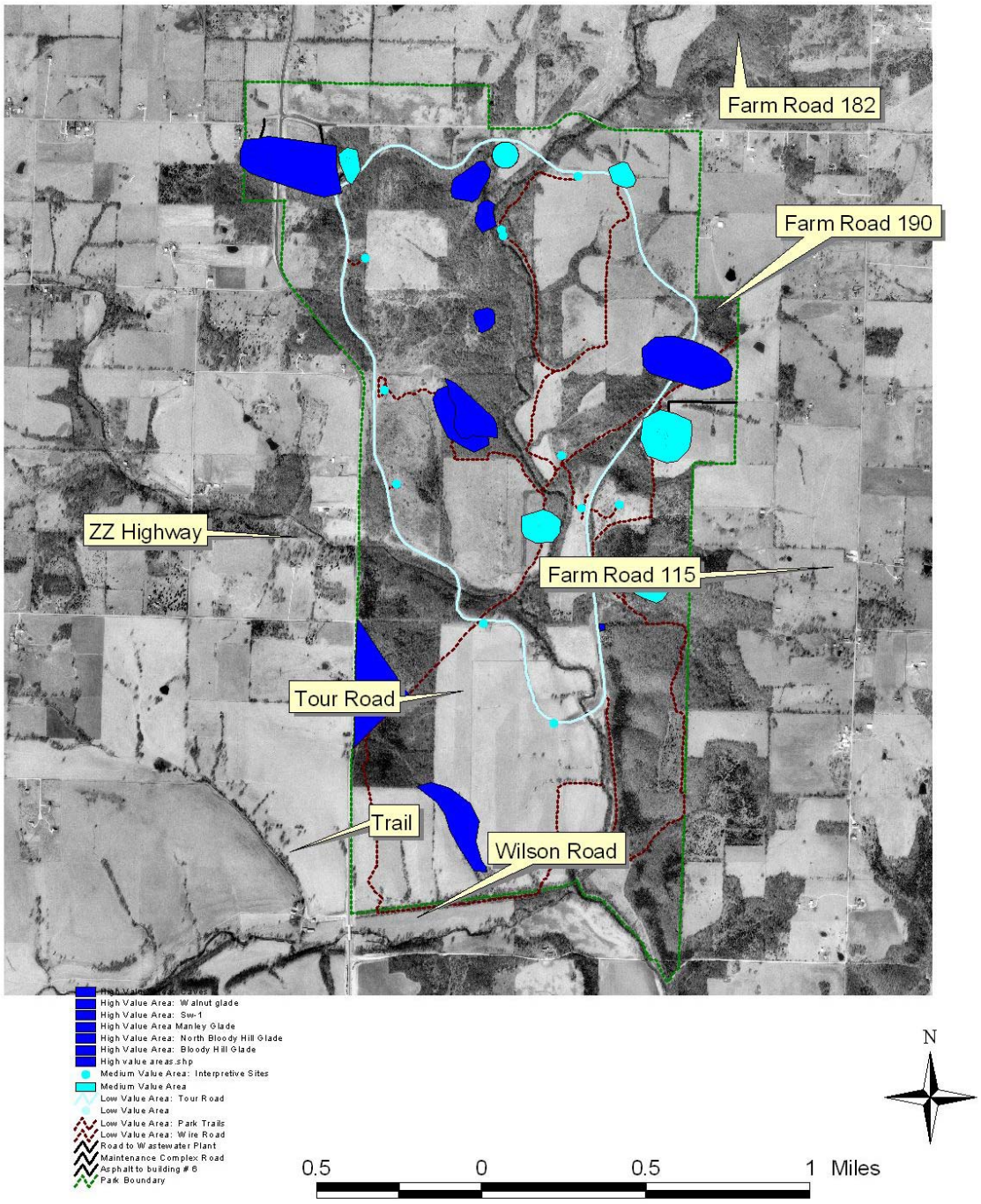
VALUE AREAS

HIGH = Visitor center, Ray House, Ray Springhouse, glades, maintenance complex.

MEDIUM = Developed areas, cemeteries, interpretive sites, Edwards cabin, building # 6, old wastewater plant.

LOW = Other structures, trails

Fire Prevention Plan Value Areas Map
Wilson's Creek National Battlefield



APPENDIX K

K. RENTAL EQUIPMENT AGREEMENTS

None

APPENDIX L

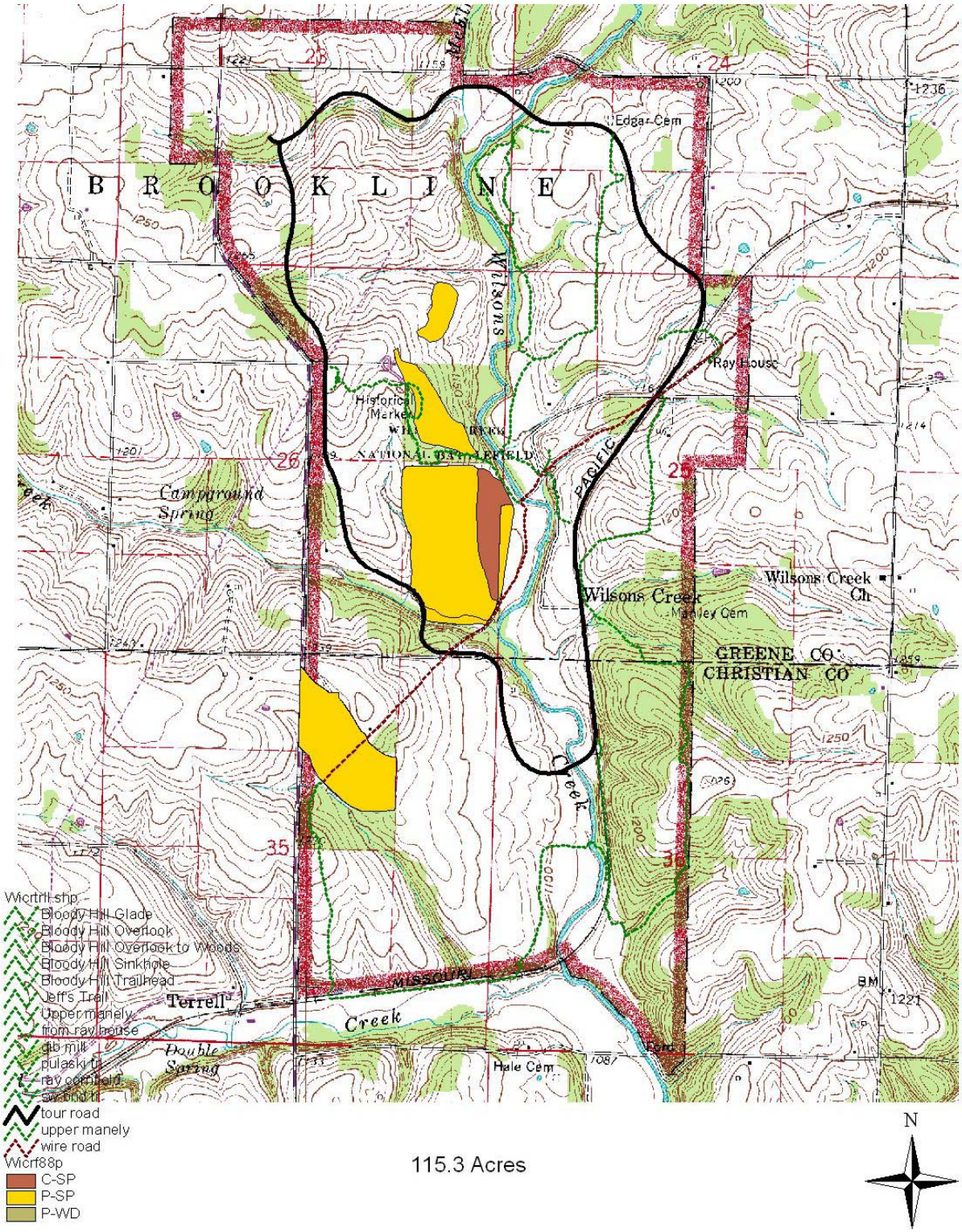
L. CONTRACTS FOR SUPPRESSION AND PRESCRIBED FIRE RESOURCES

None

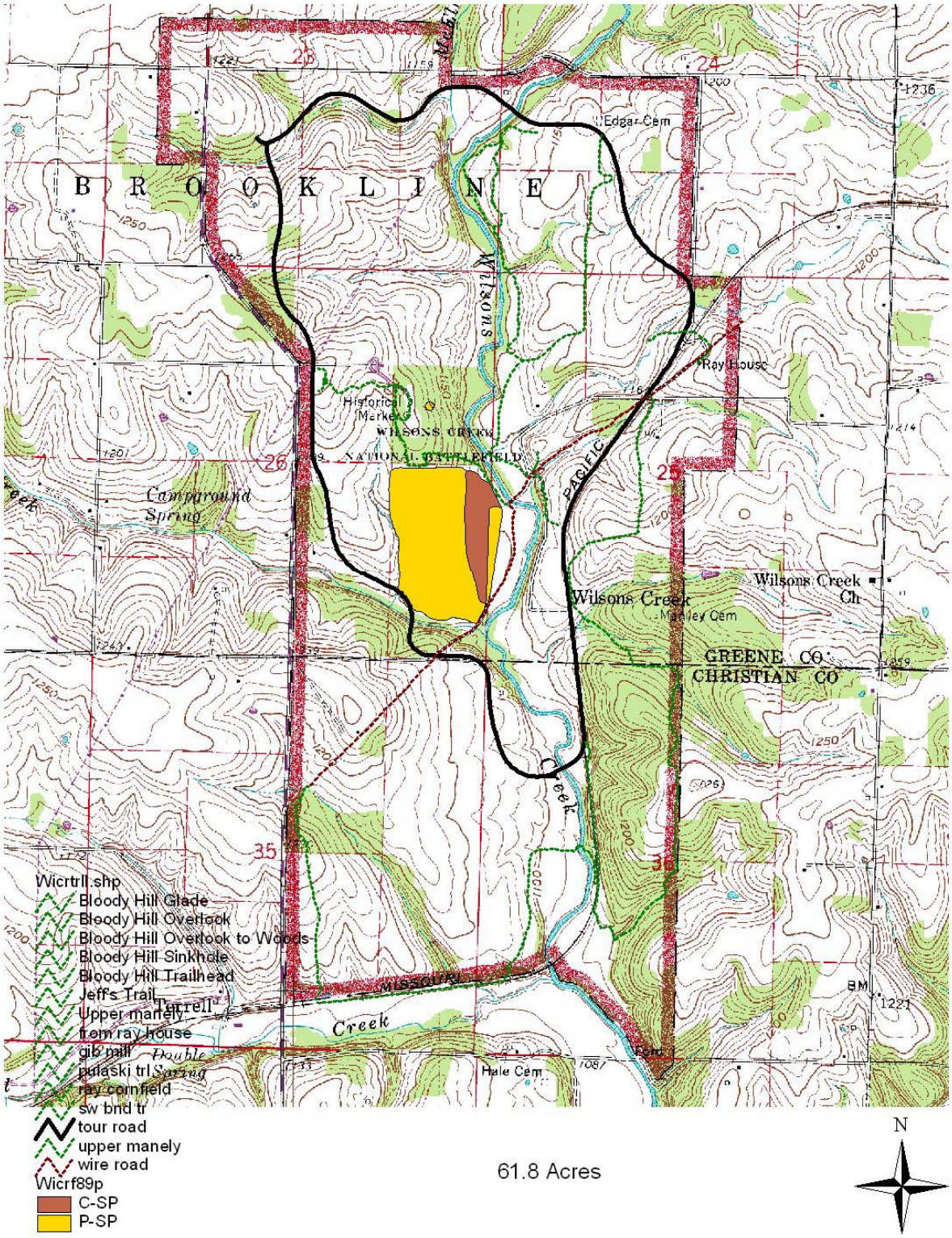
APPENDIX M

M. FIRE MANAGEMENT HISTORY

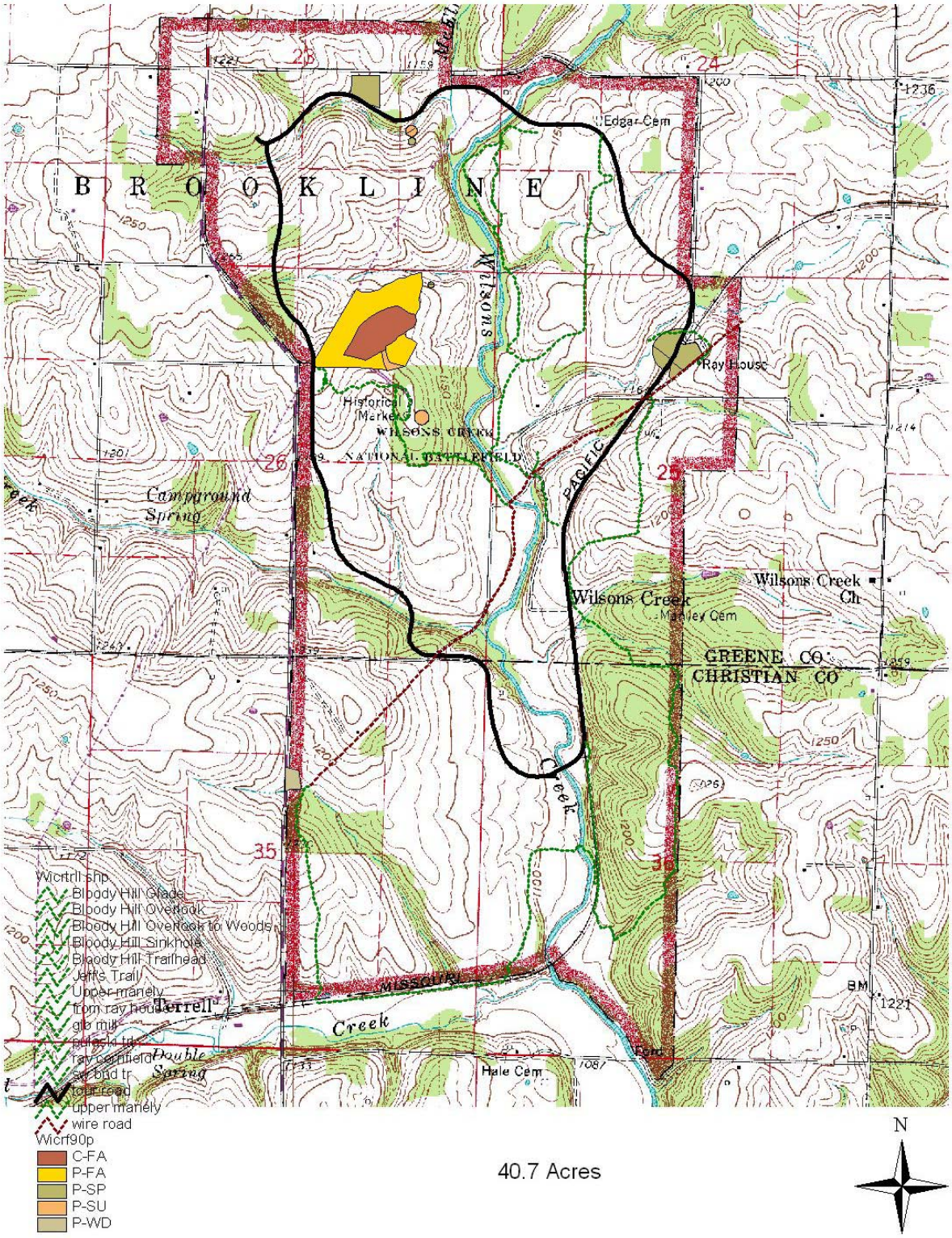
FY 1988 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



FY 1989 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



FY 1990 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



FY 1991 Prescribed Burns Accomplished
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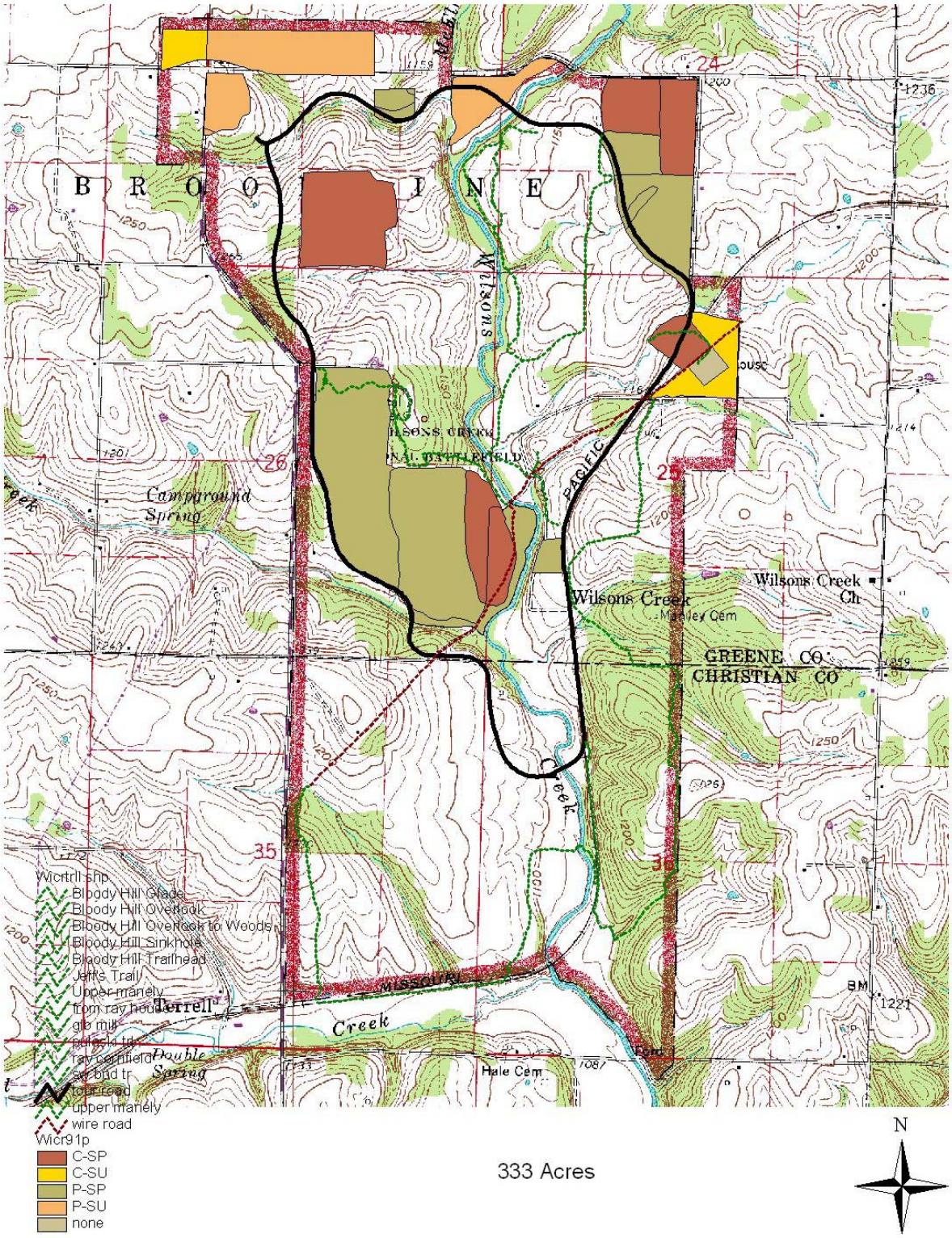

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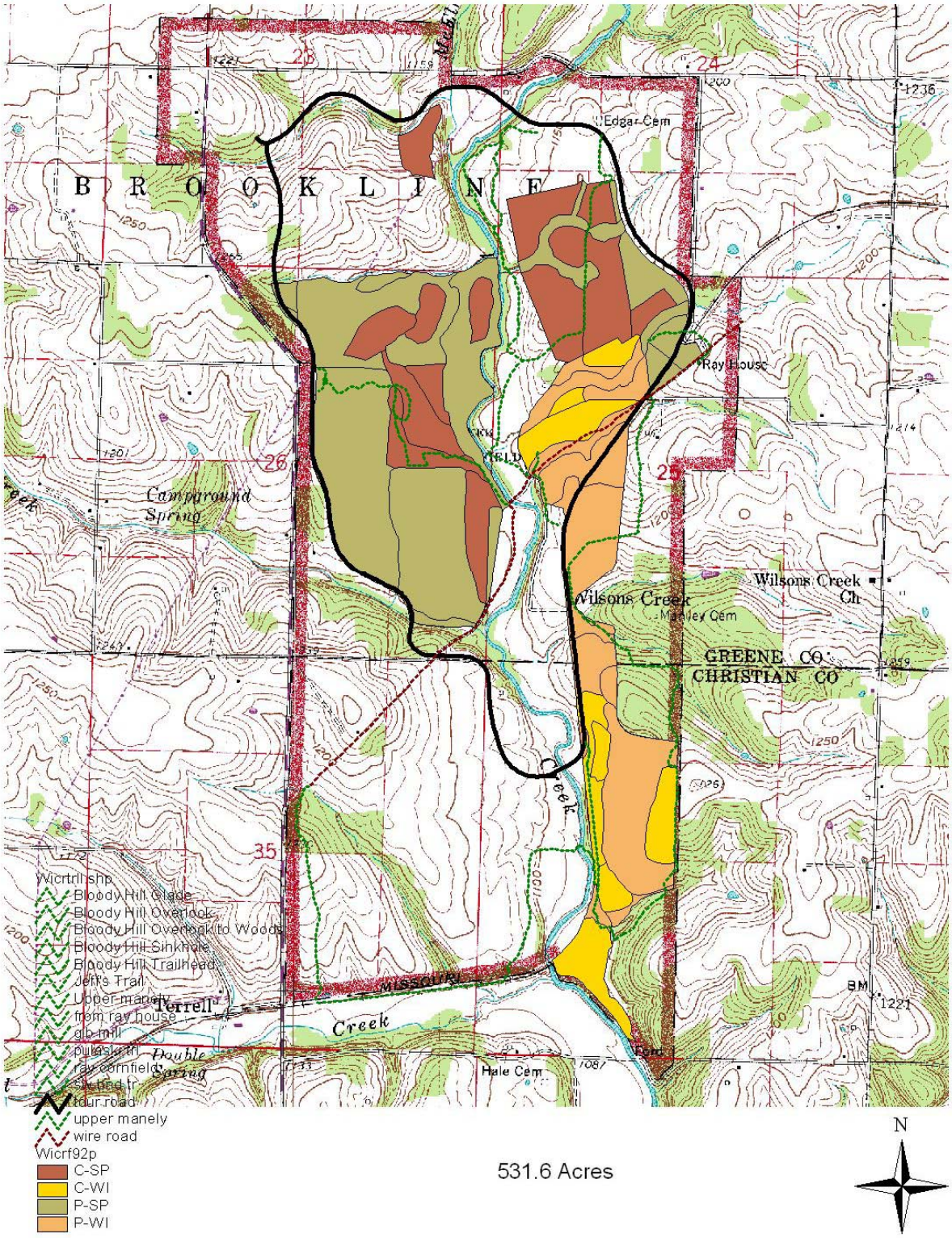

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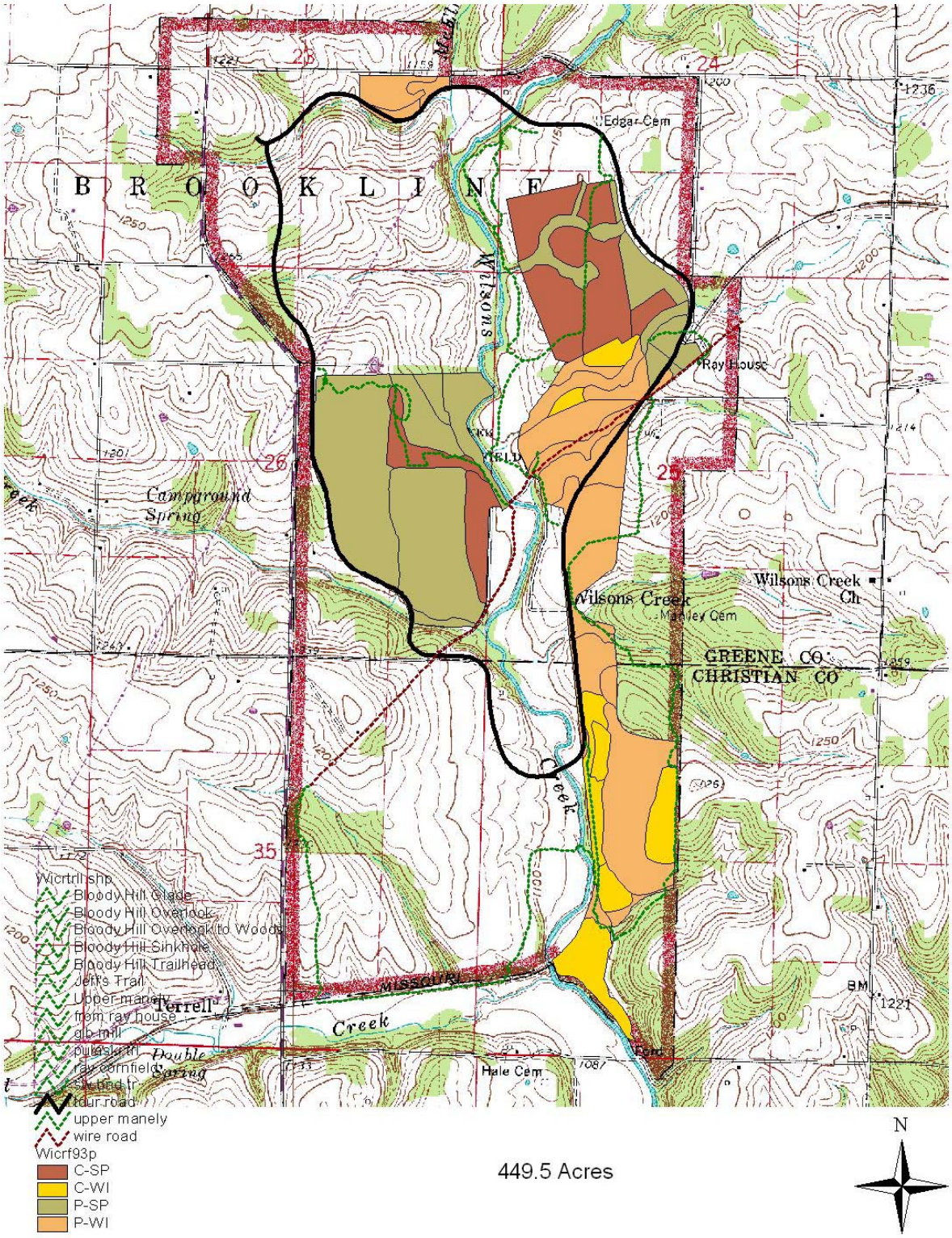
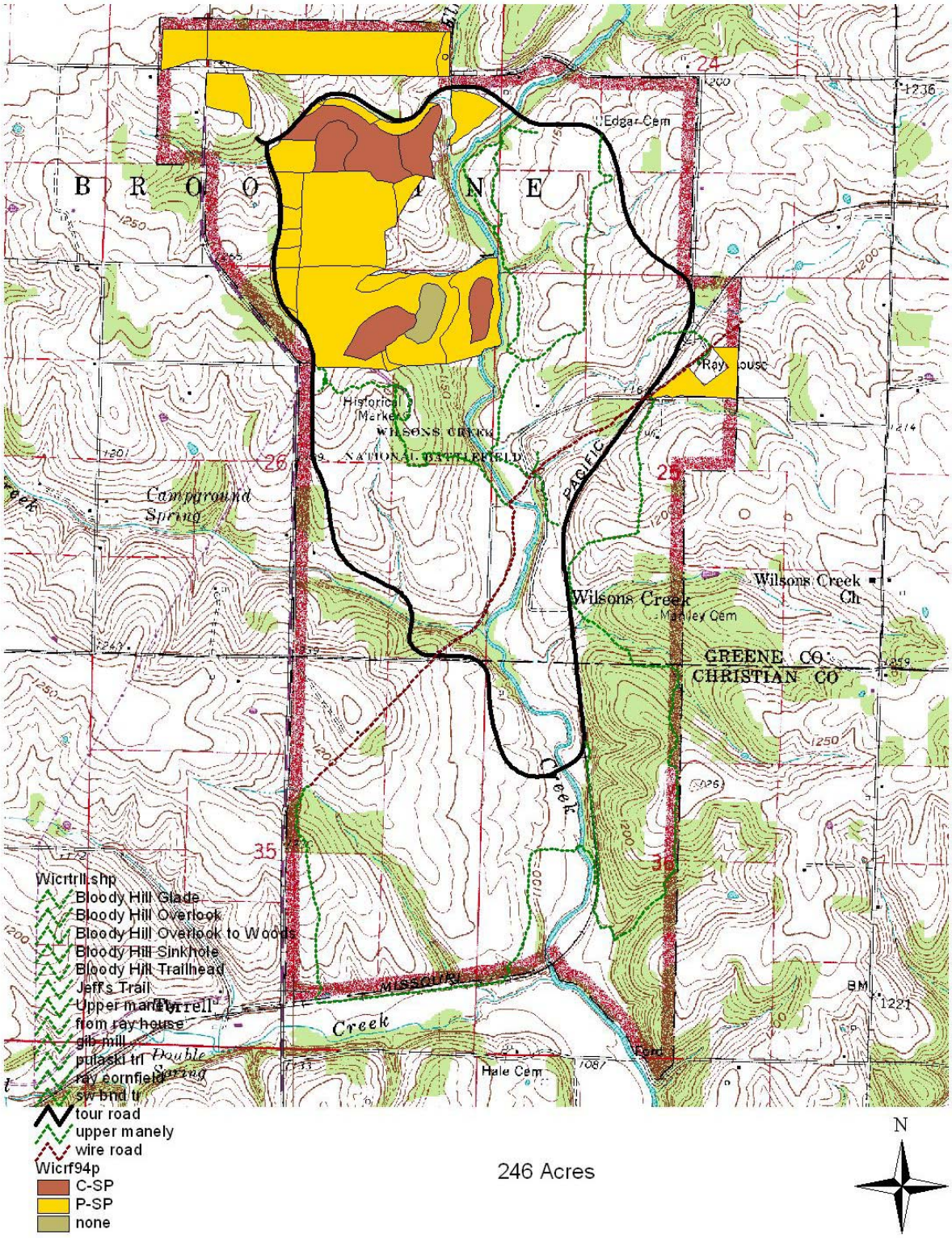
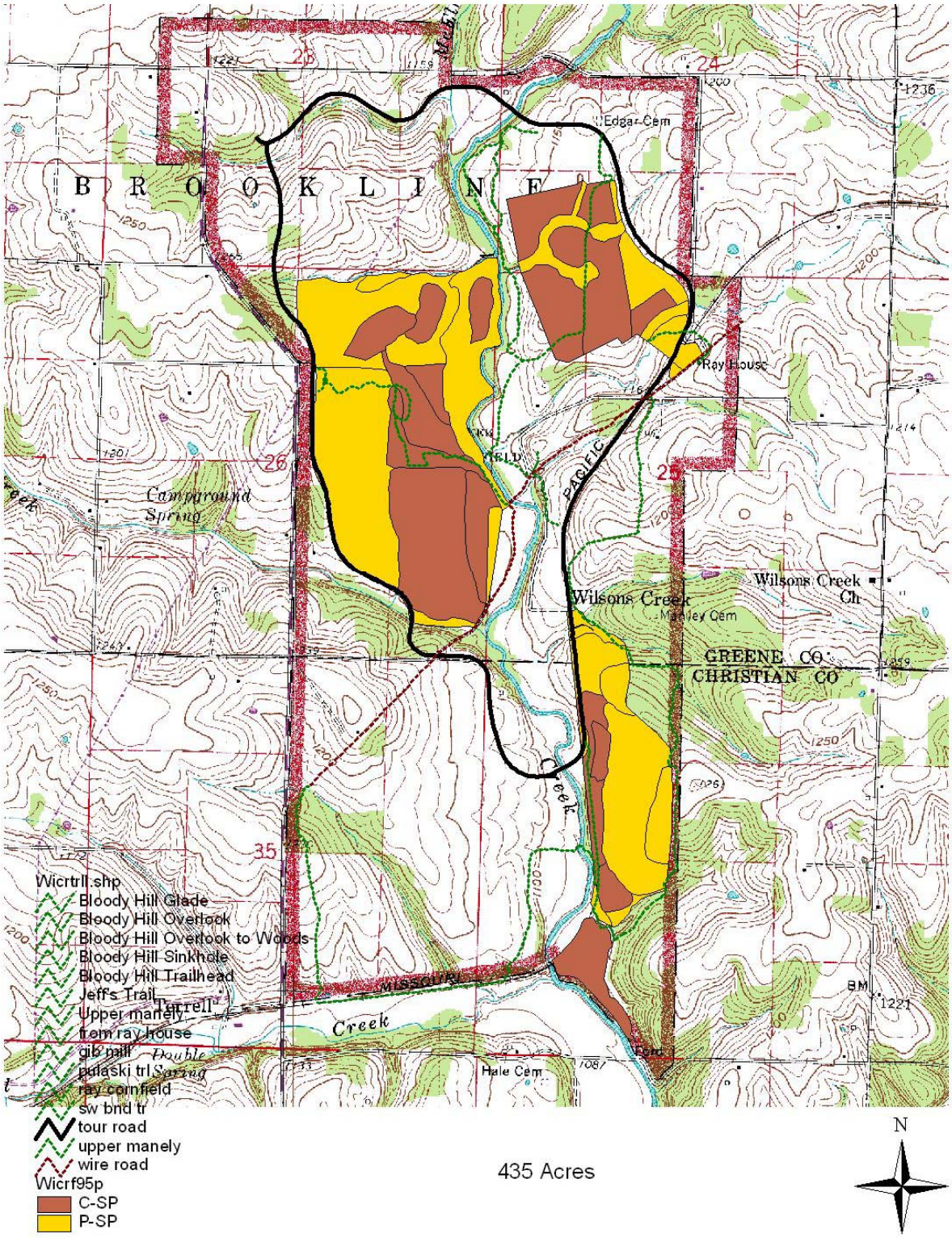
Wilson's Creek National Battlefield



FY 1994 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



FY 1995 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



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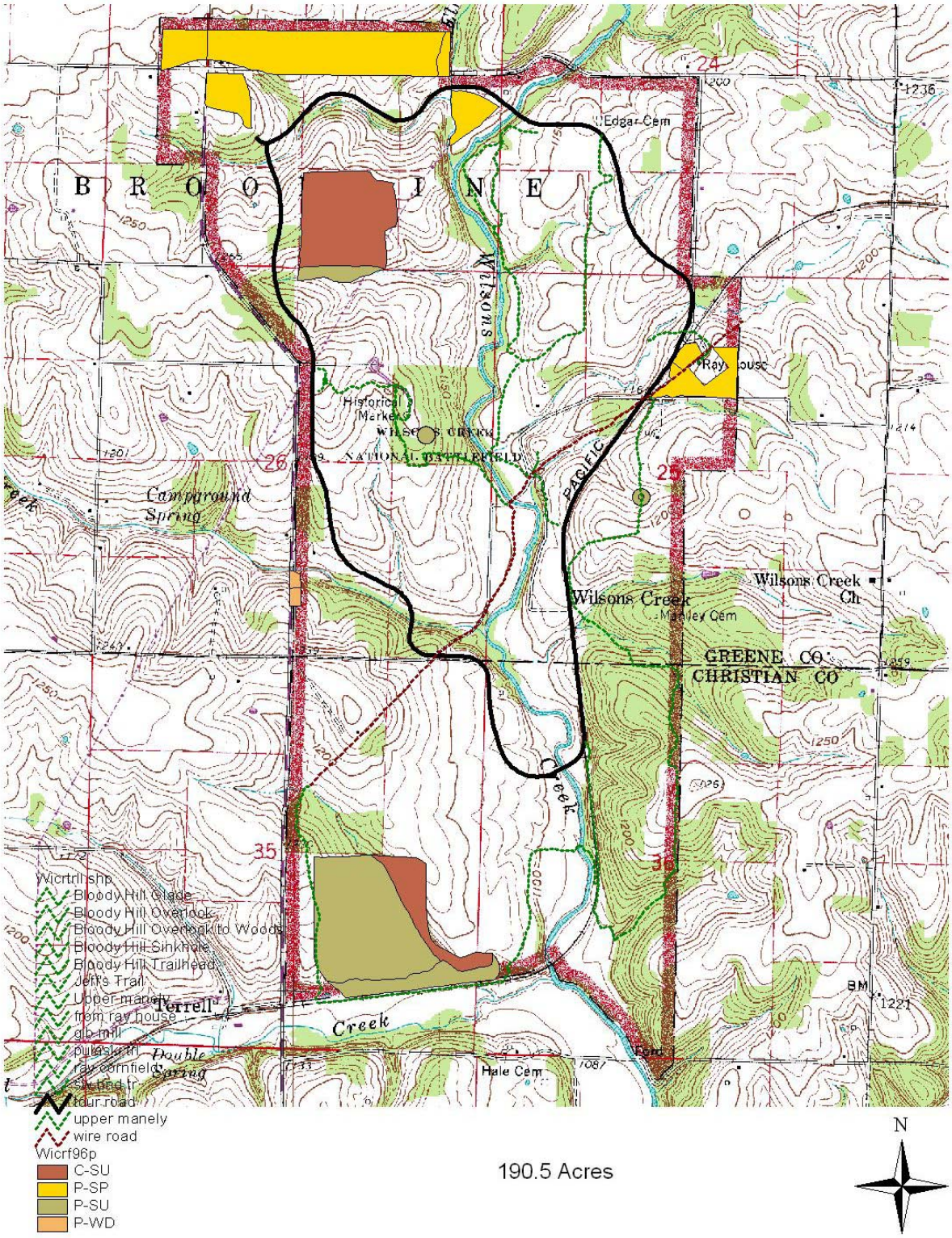
Wilson's Creek National Battlefield



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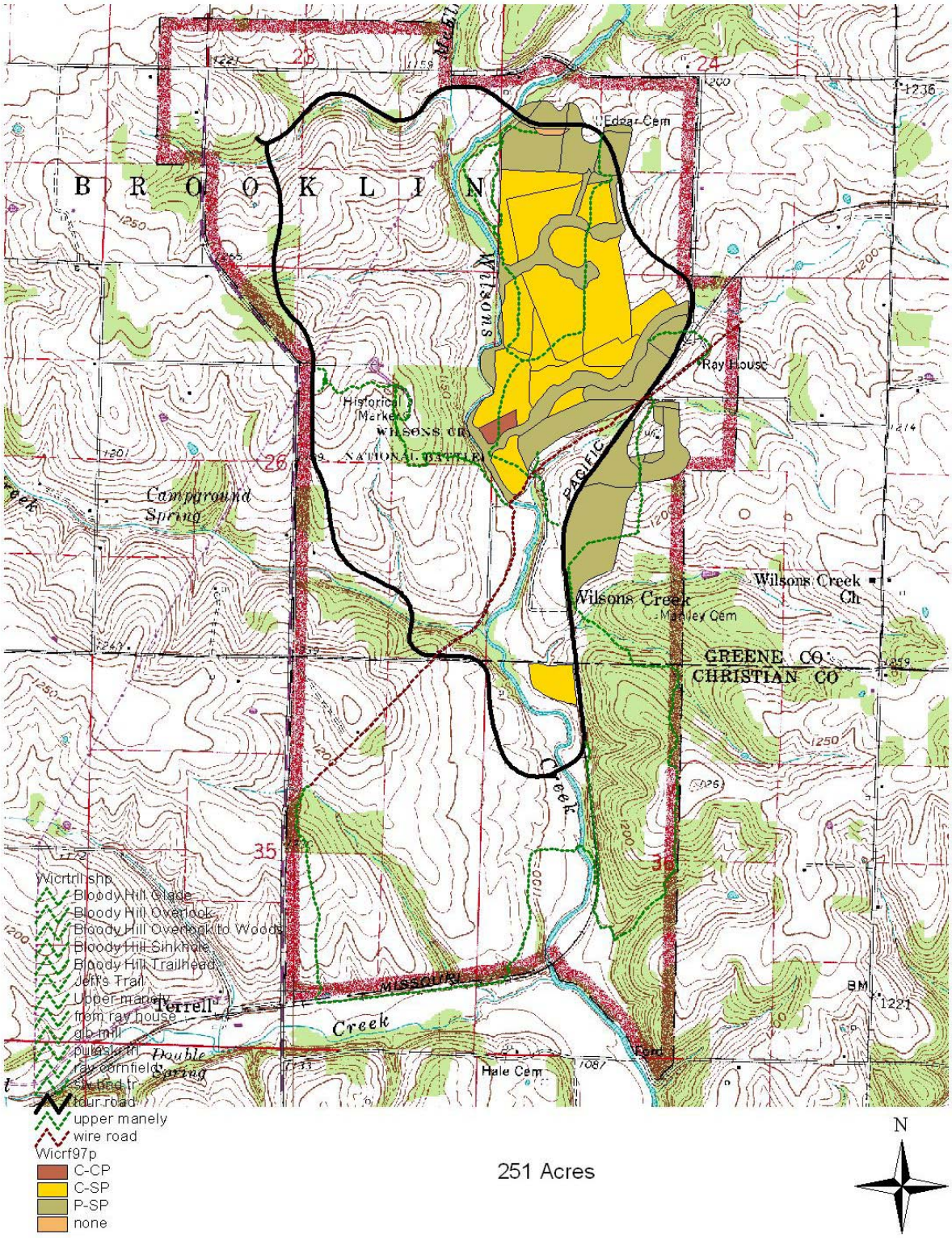

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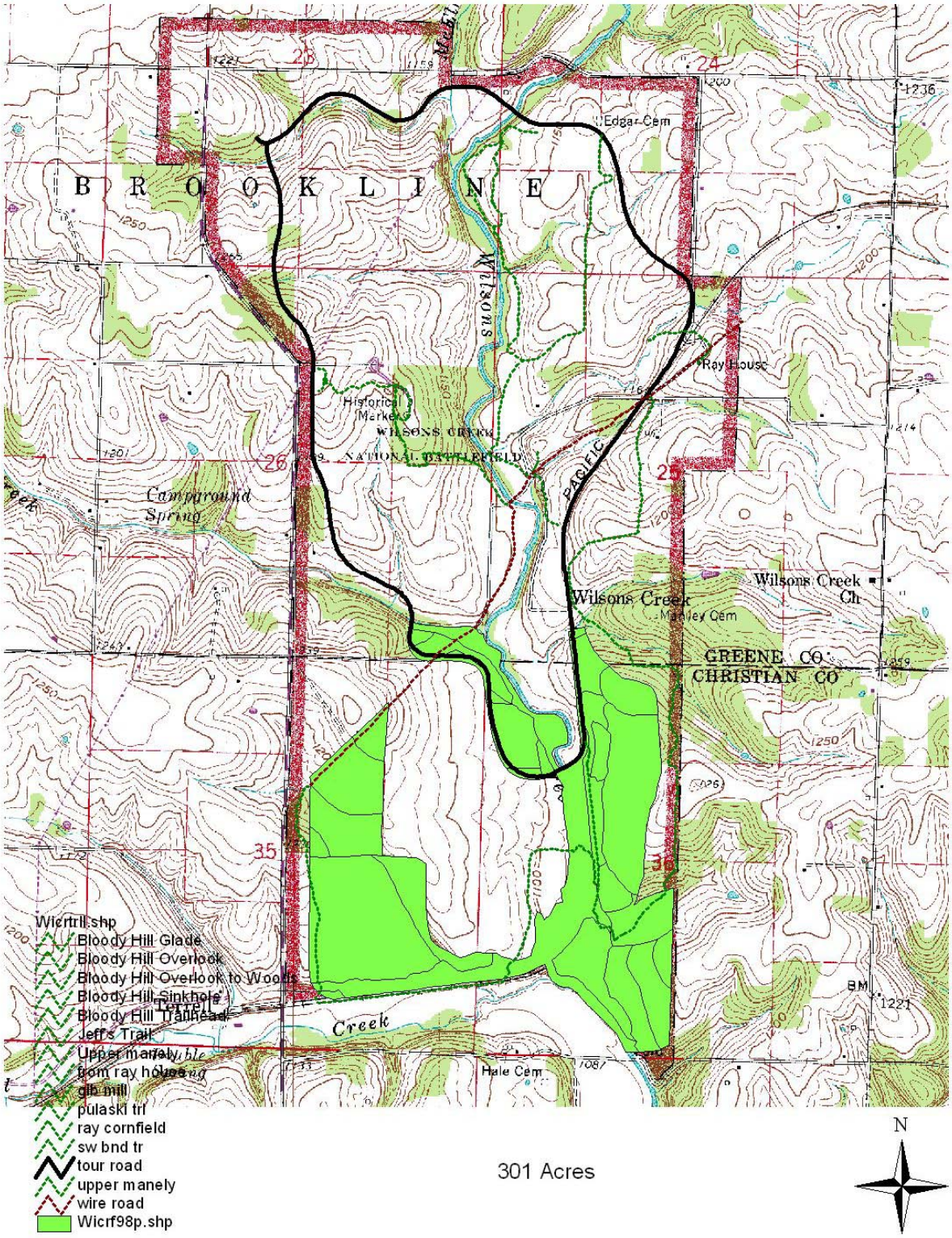
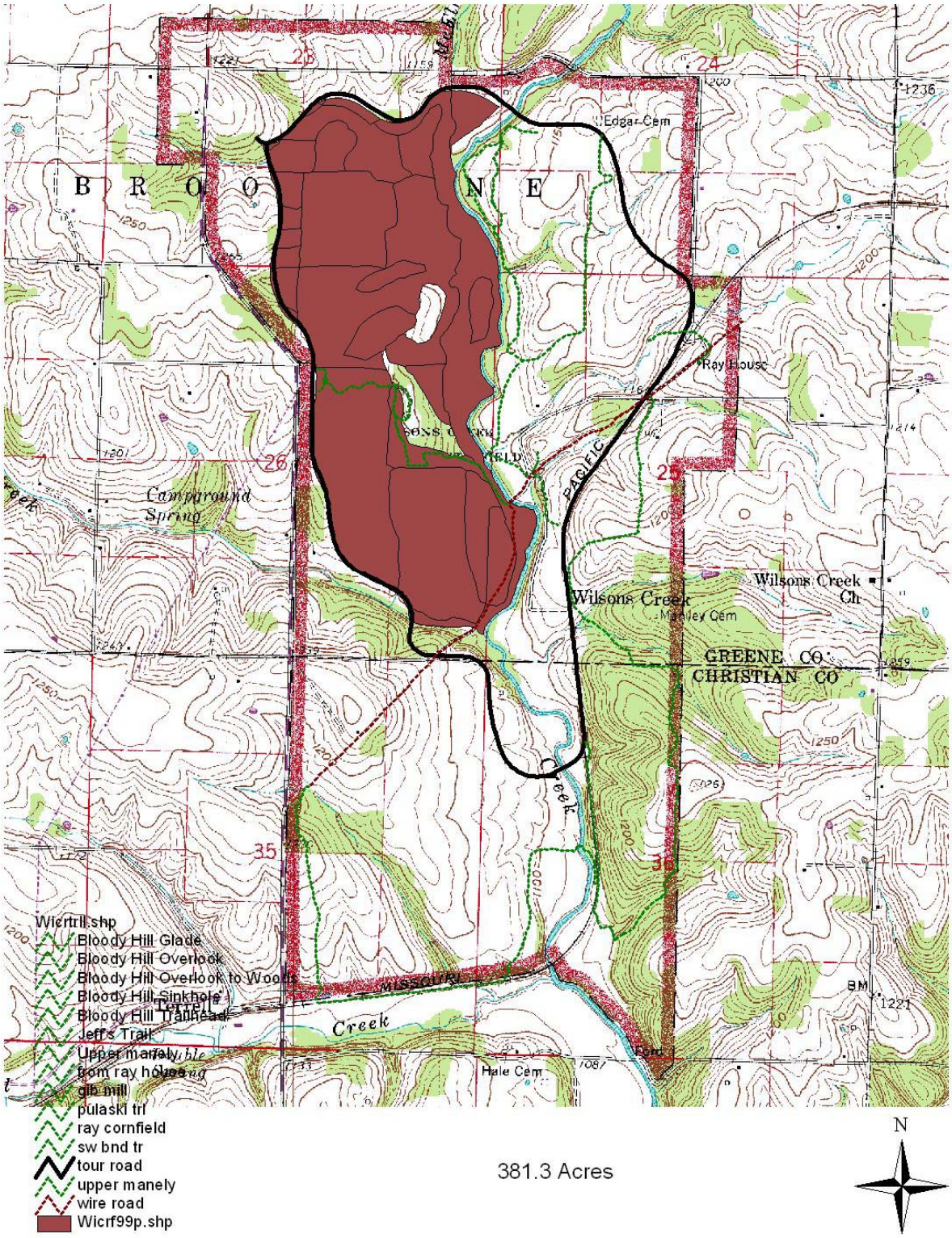
Wilson's Creek National Battlefield



FY 1999 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



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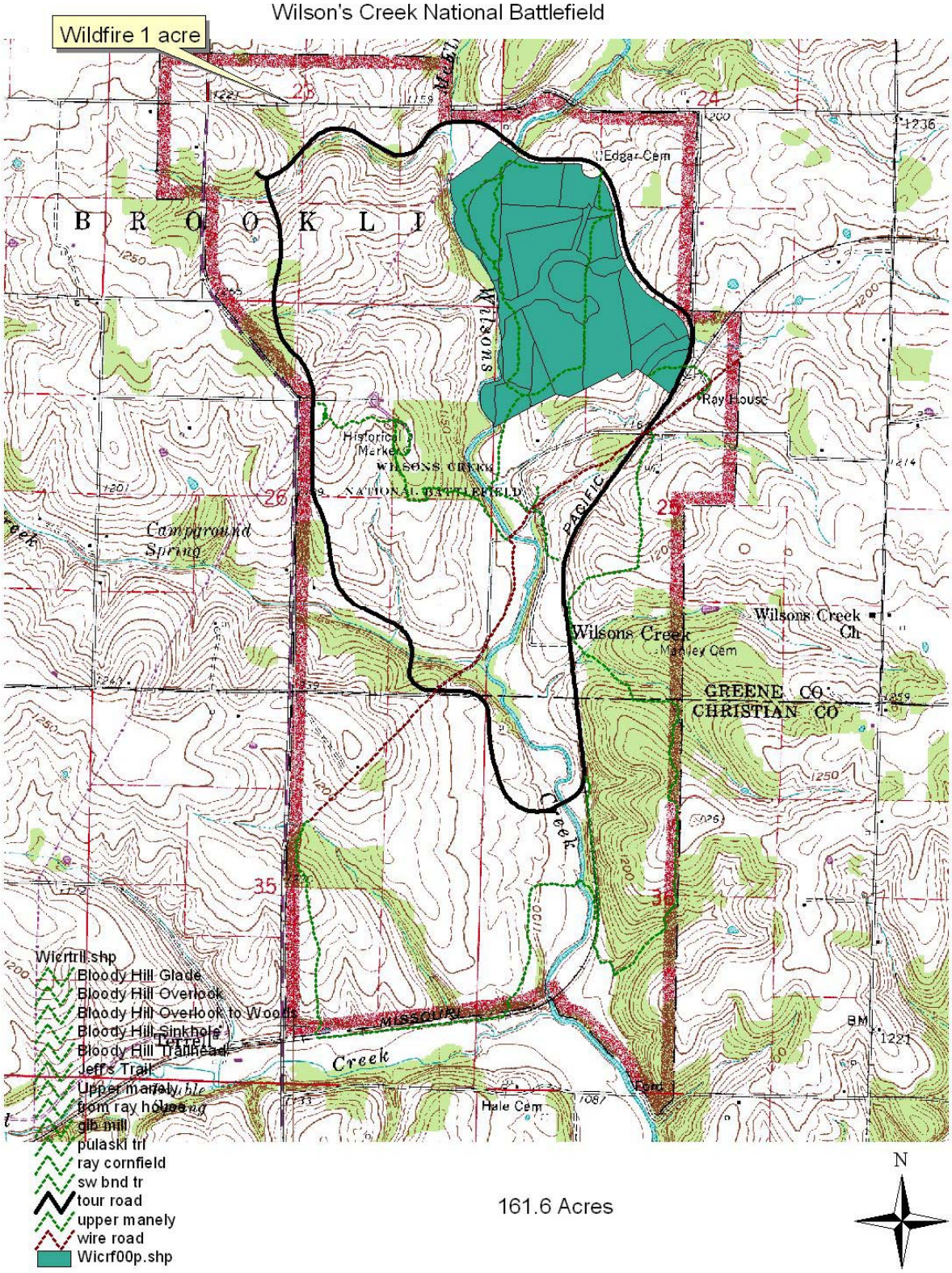

FY 2001 Prescribed Burns Accomplished
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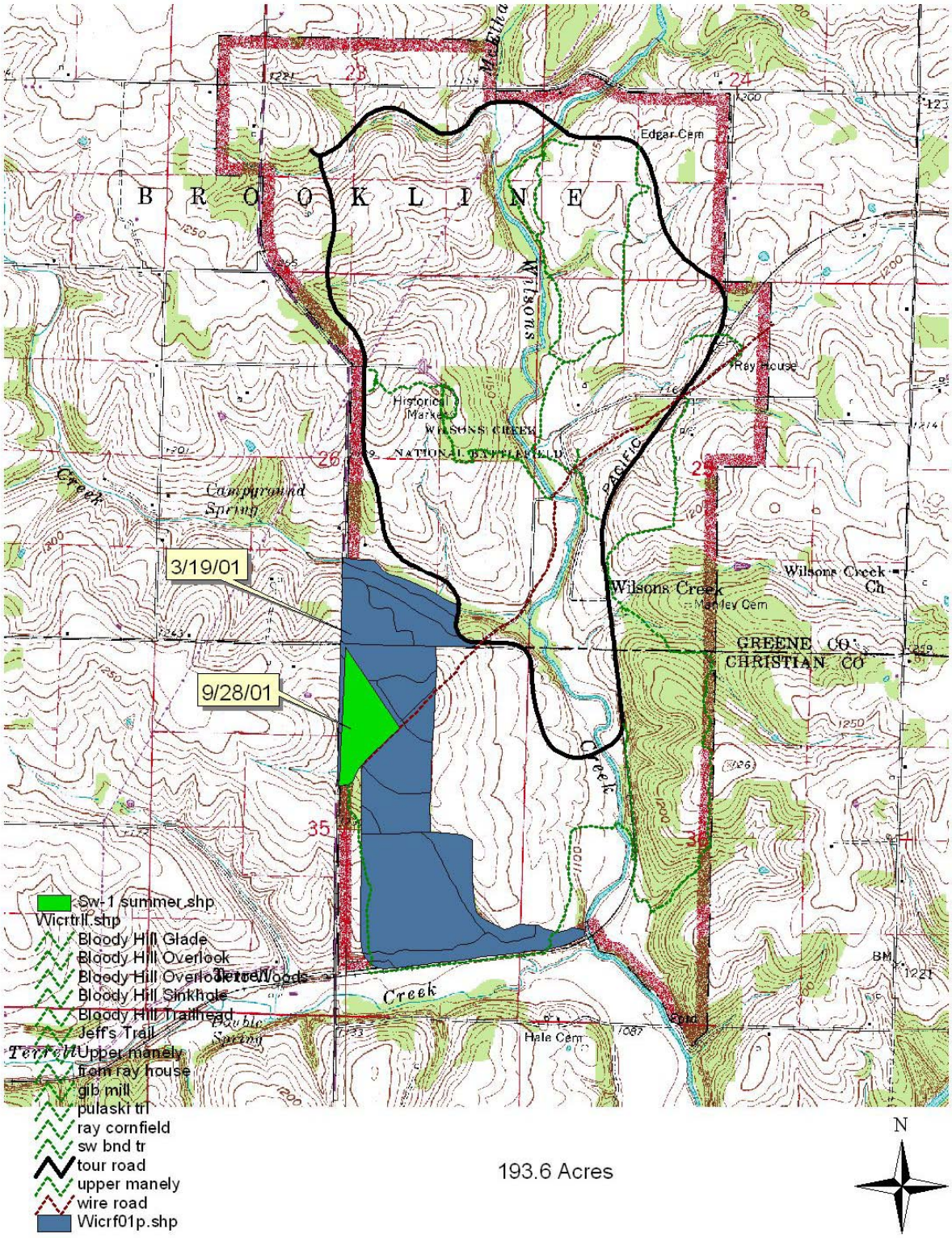
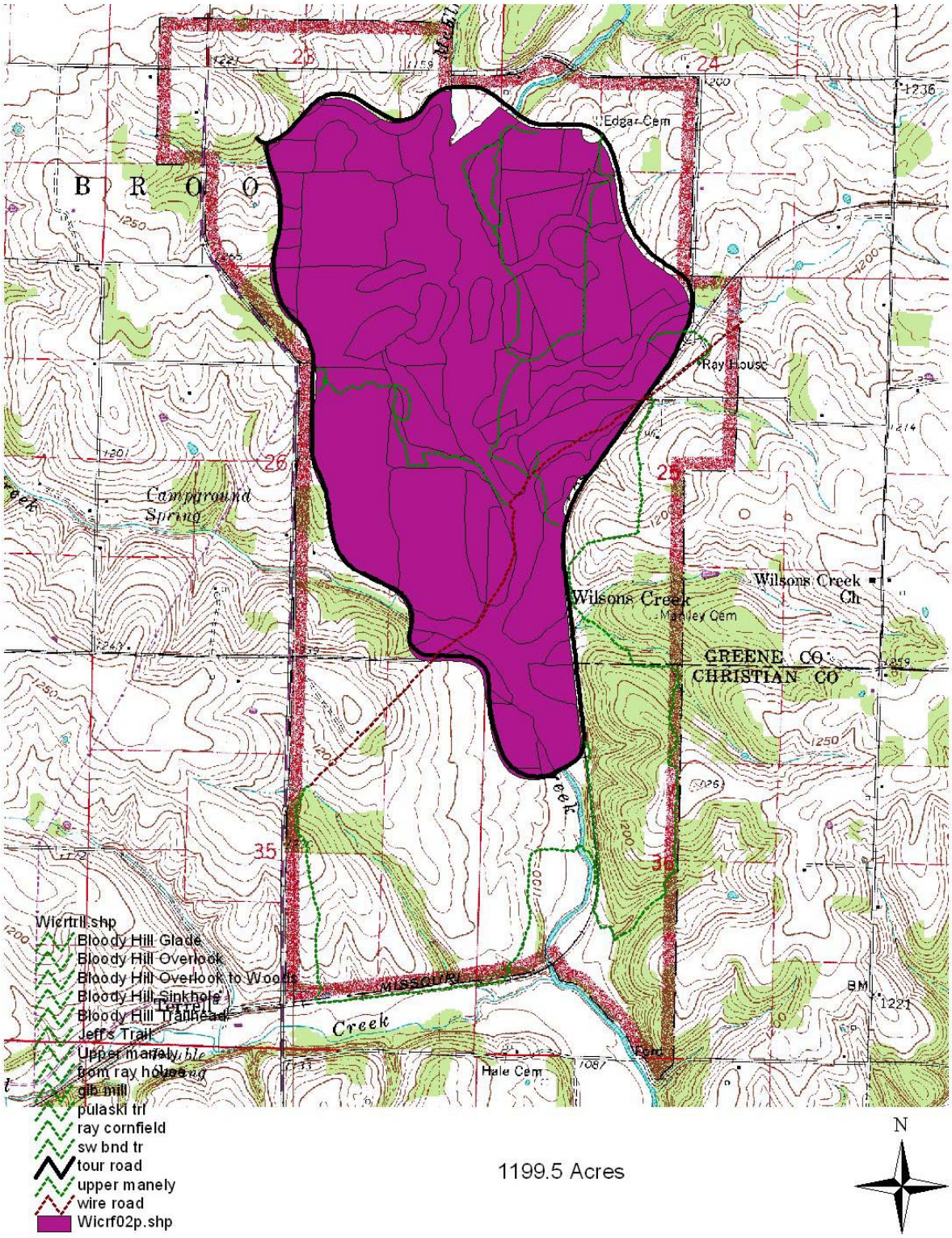
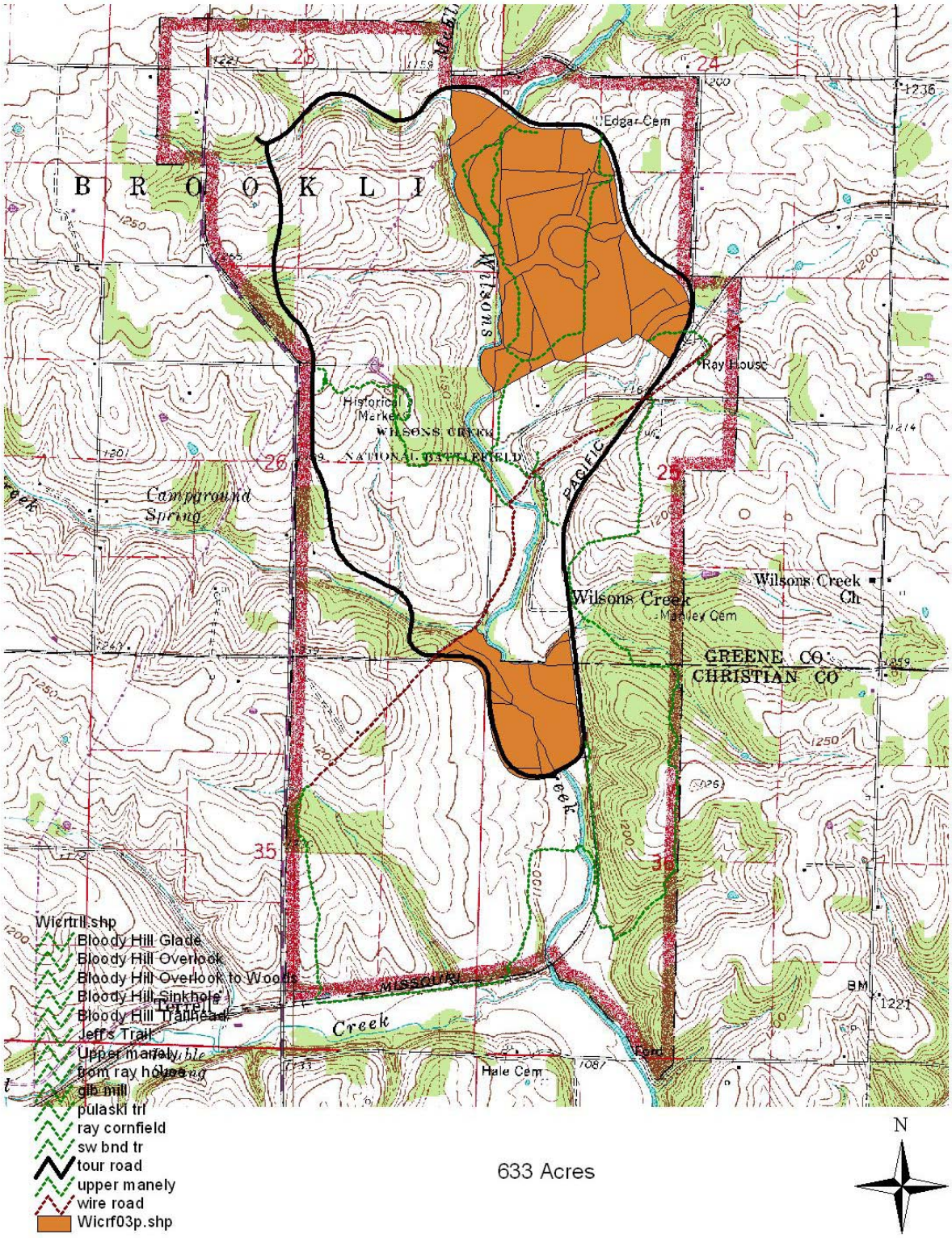


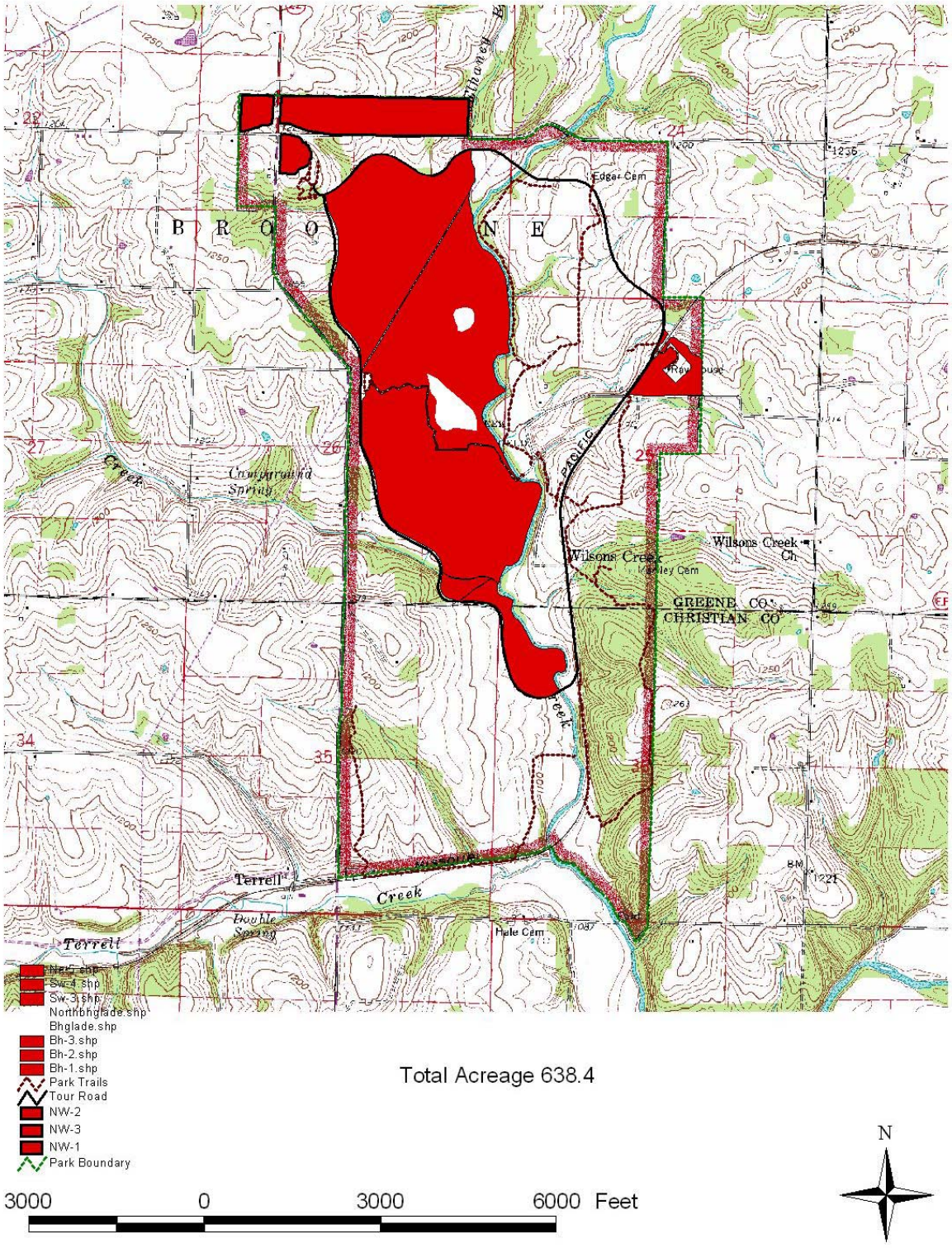
FY 2002 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



FY 2003 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



FY 2004 Prescribed Burns Accomplished
Wilson's Creek National Battlefield



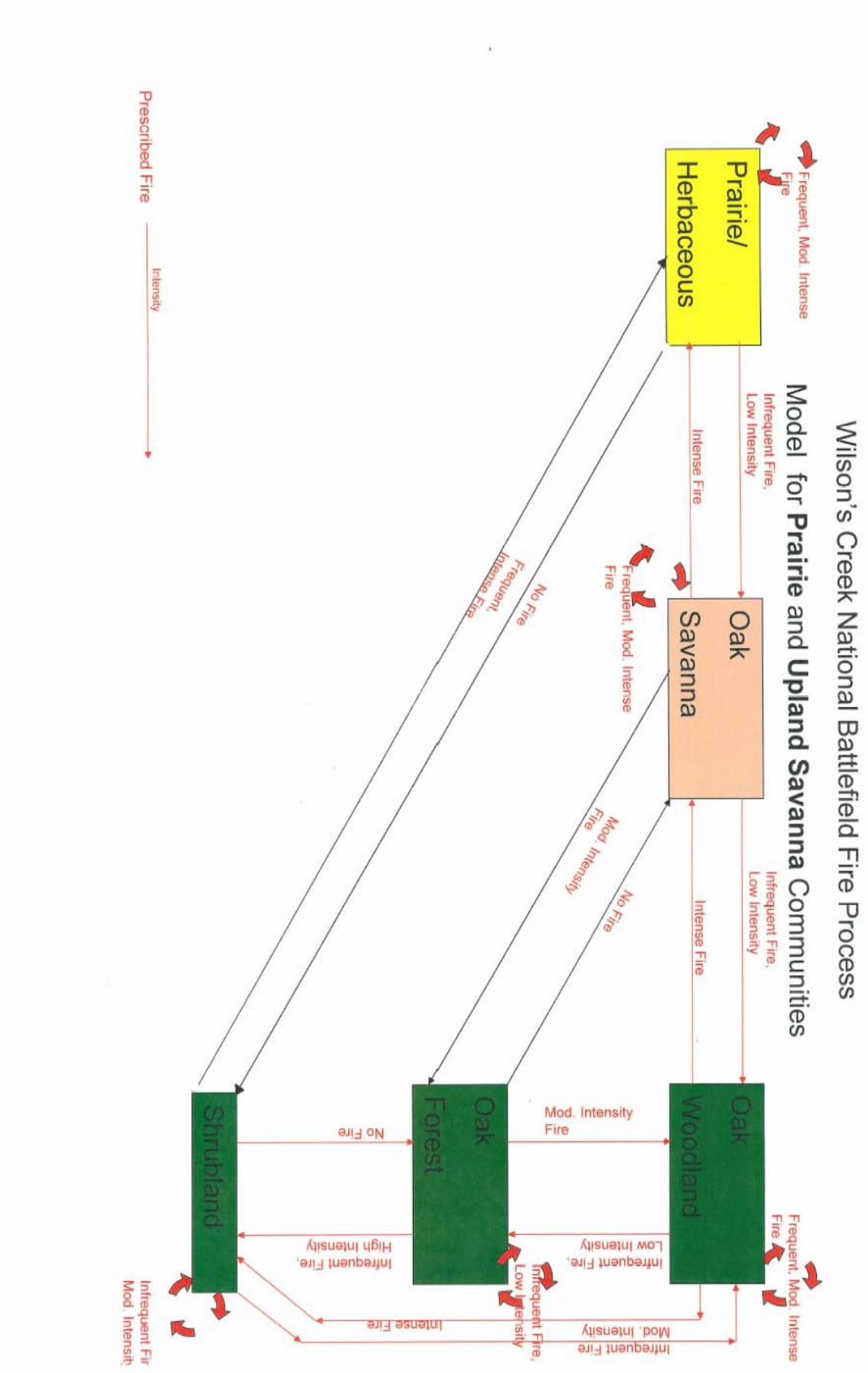
Total Acreage 638.4

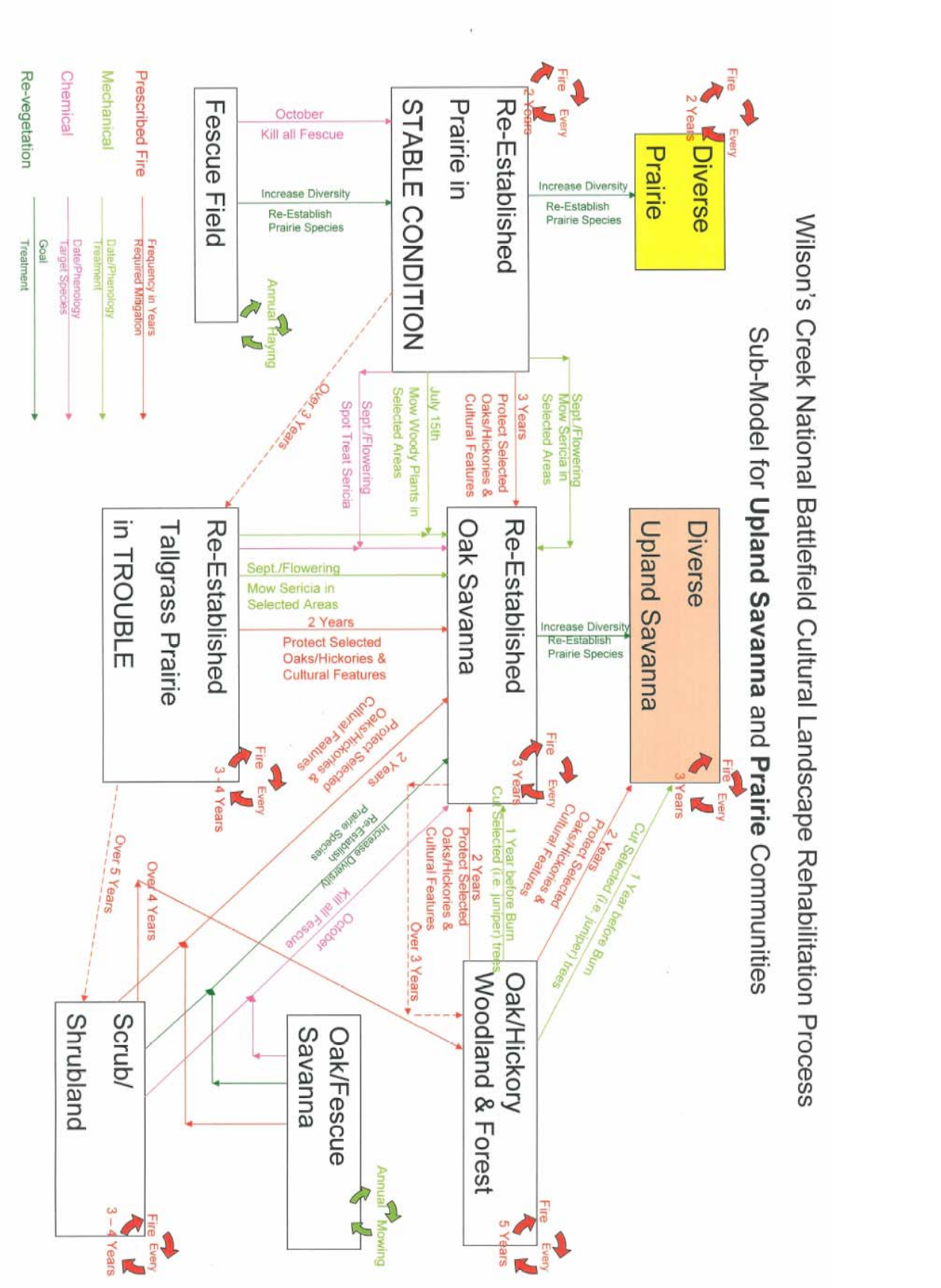
APPENDIX N

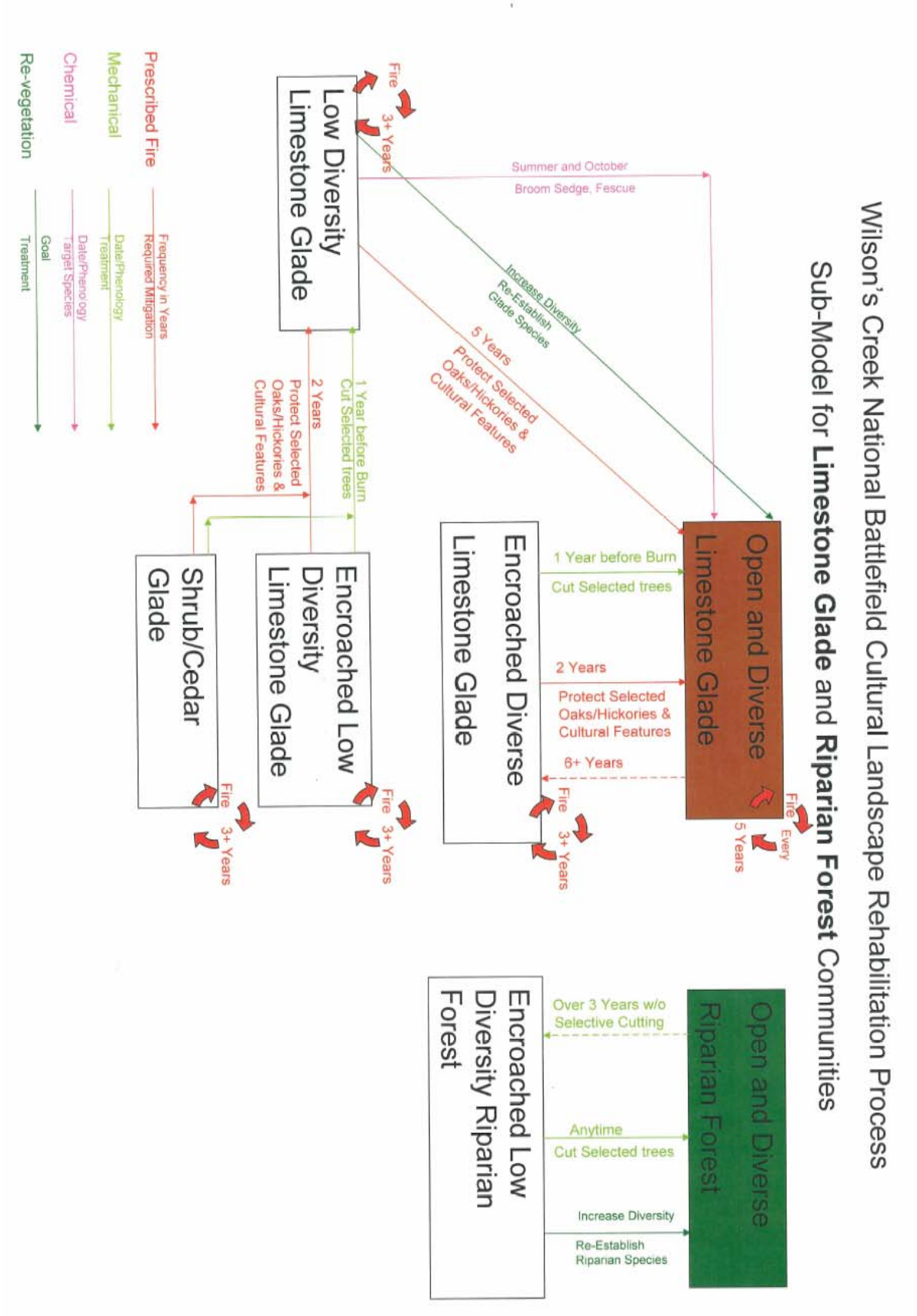
N. ECOLOGICAL MODELS RELATED TO FIRE MANAGEMENT AT WILSON'S CREEK NATIONAL BATTLEFIELD

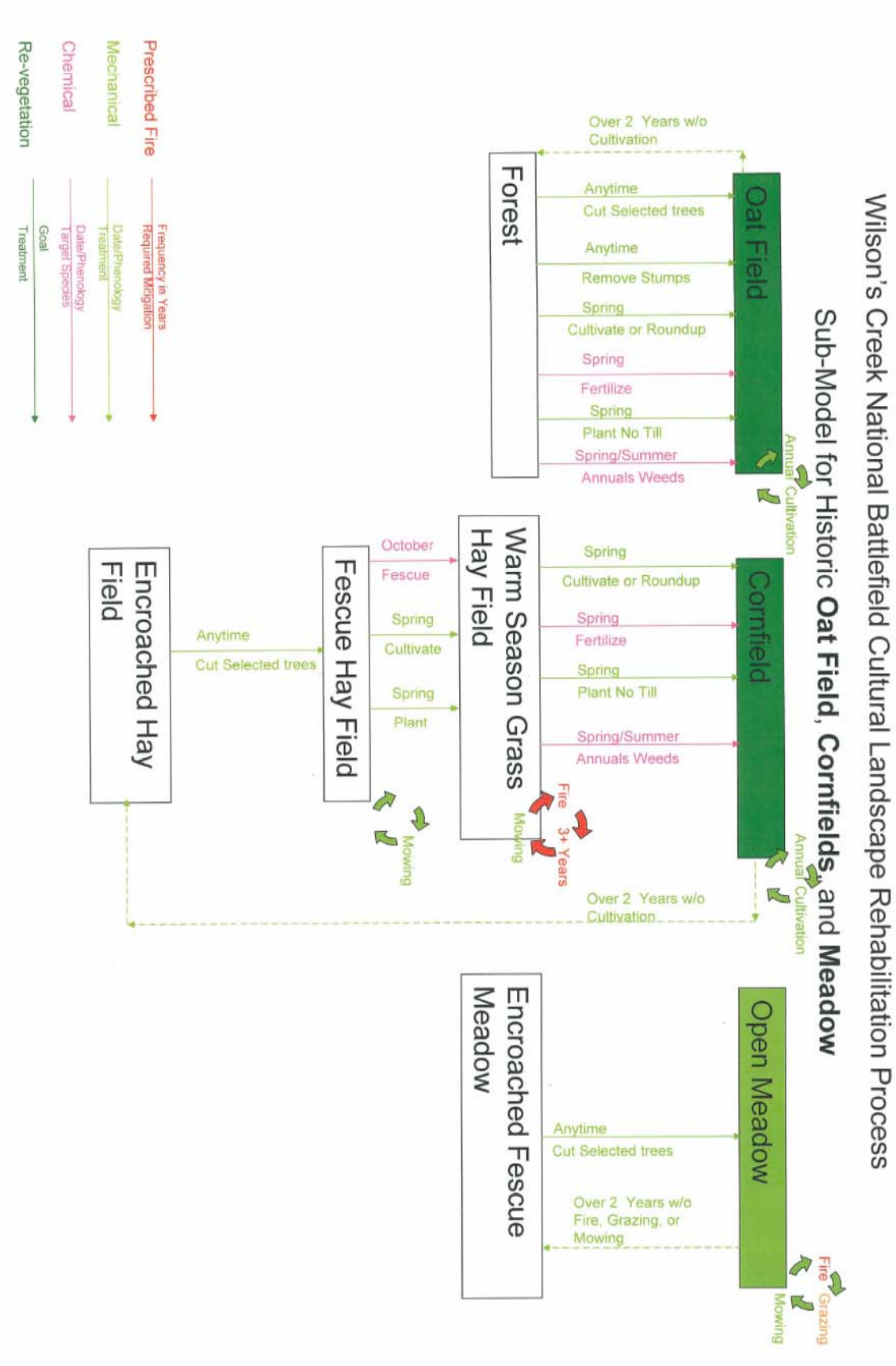
The following ecological models are meant to be used with figures 5,6, and 7. The colors on the models correspond with colors representing community types on the figures. This provides a crude method of determining how the existing vegetation (2003) compares to the pre-settlement vegetation and the vegetation present in 1861. The reader can then use the models as an aid in determining what treatment methods might be appropriate to move from one vegetation condition to another.

The models were developed by reviewing existing models from the Prairie Cluster Long Term Ecological Monitoring Program, The Nature Conservancy Loess Hills and Arkansas River Valley and Oak Ecosystem, and the U.S. Fish and Wildlife Service. Specific models were then constructed for use at Wilson's Creek National Battlefield. The first model is very similar to the model developed by the Nature Conservancy for the Arkansas River Valley Prairie and Oak Ecosystem. The remaining models are very management oriented and were developed specifically for use at Wilson's Creek.


Wilson's Creek National Battlefield Fire Process
Model for Prairie and Upland Savanna Communities
Prescribed Fire
Intensity
Prairie/ Herbaceous
Frequent, Mod. Intense Fire
Oak Savanna
Frequent, Mod. Intense Fire
Oak Woodland
Frequent, Mod. Intense Fire
Oak Forest
Shrubland
Infrequent Fire, Low Intensity
Intense Fire
Frequent, Intense Fire
No Fire
Mod. Intensity Fire
Infrequent Fire, Low Intensity
Infrequent Fire, High Intensity
Infrequent Fire, Mod. Intensity
Low Intensity Fire
Infrequent Fire, Mod. Intensity
Intense Fire
No Fire
Infrequent Fire, Low Intensity
Infrequent Fire, Mod. Intensity
Intense Fire
Infrequent Fire, Mod. Intensity


Wilson's Creek National Battlefield Cultural Landscape Rehabilitation Process
Sub-Model for Upland Savanna and Prairie Communities
Diverse Prairie
Re-Established Prairie in STABLE CONDITION
Fescue Field
Re-Established Tallgrass Prairie in TROUBLE
Diverse Upland Savanna
Re-Established Oak Savanna
Oak/Hickory Woodland & Forest
Oak/Fescue Savanna
Scrub/ Shrubland
Fire Every 2 Years
Increase Diversity
Re-Establish Prairie Species
October
Kill all Fescue
Annual Haying
Over 3 Years
Spot Treat Sericia
Sept./Flowering
Mow Woody Plants in Selected Areas
July 15th
3 Years
Protect Selected Oaks/Hickories & Cultural Features
Sept./Flowering
Mow Sericia in Selected Areas
2 Years
Protect Selected Oaks/Hickories & Cultural Features
Fire Every 3 – 4 Years
Fire Every 3 Years
Cut Selected (i.e. juniper) trees
1 Year before Burn
Protect Selected Oaks/Hickories & Cultural Features
2 Years
Protect Selected Oaks/Hickories & Cultural Features
Over 3 Years
Over 4 Years
Over 5 Years
Increase Diversity
Re-Establish Prairie Species
October
Kill all Fescue
Annual Mowing
Fire Every 5 Years
Fire Every 3 – 4 Years
Prescribed Fire
Mechanical
Chemical
Re-vegetation
Frequency in Years Required Mitigation
Date/Phenology Treatment
Date/Phenology Target Species
Goal Treatment


Wilson's Creek National Battlefield Cultural Landscape Rehabilitation Process
Sub-Model for Limestone Glade and Riparian Forest Communities
Low Diversity Limestone Glade
Fire
3+ Years
Summer and October
Broom Sedge, Fescue
Increase Diversity
Re-Establish Glade Species
5 Years
Protect Selected Oaks/Hickories & Cultural Features
1 Year before Burn
Cut Selected trees
2 Years
Protect Selected Oaks/Hickories & Cultural Features
Open and Diverse Limestone Glade
Fire
Every 5 Years
Encroached Diverse Limestone Glade
1 Year before Burn
Cut Selected trees
2 Years
Protect Selected Oaks/Hickories & Cultural Features
6+ Years
Fire
3+ Years
Encroached Low Diversity Limestone Glade
Fire
3+ Years
Shrub/Cedar Glade
Fire
3+ Years
Prescribed Fire
Frequency in Years Required Mitigation
Mechanical
Date/Phenology Treatment
Chemical
Date/Phenology Target Species
Re-vegetation
Goal Treatment
Encroached Low Diversity Riparian Forest
Over 3 Years w/o Selective Cutting
Anytime
Cut Selected trees
Increase Diversity
Re-Establish Riparian Species
Open and Diverse Riparian Forest


Wilson's Creek National Battlefield Cultural Landscape Rehabilitation Process
Sub-Model for Historic Oat Field, Cornfields, and Meadow
Prescribed Fire
Frequency in Years
Required Mitigation
Mechanical
Date/Phenology
Treatment
Chemical
Date/Phenology
Target Species
Re-vegetation
Goal
Treatment
Forest
Over 2 Years w/o Cultivation
Oat Field
Anytime
Cut Selected trees
Anytime
Remove Stumps
Spring
Cultivate or Roundup
Spring
Fertilize
Spring
Plant No Till
Spring/Summer
Annuals Weeds
Annual Cultivation
Cornfield
Spring
Cultivate or Roundup
Spring
Fertilize
Spring
Plant No Till
Spring/Summer
Annuals Weeds
Annual Cultivation
Warm Season Grass Hay Field
Fire
3+ Years
Mowing
Fescue Hay Field
October
Fescue
Spring
Cultivate
Spring
Plant
Mowing
Encroached Hay Field
Anytime
Cut Selected trees
Over 2 Years w/o Cultivation
Open Meadow
Fire
Grazing
Mowing
Encroached Fescue Meadow
Anytime
Cut Selected trees
Over 2 Years w/o Fire, Grazing, or Mowing

APPENDIX O

O. WILDLAND FIRE IMPLEMENTATION PLAN

WILDLAND FIRE IMPLEMENTATION PLAN STAGE 1

Fire Name					
Fire Number					
Jurisdiction(s)					
Administrative Unit(s)					
FMP Unit(s)					
Geographic Area					
Management Code					
Start Date/Time					
Discovery Date/Time					
Current Date/Time					
Current Size					
Location:	Legal Description(s)	T.	R.	Sec.	Sub.
	Latitude				
	Longitude				
	UTM:				
	County:				
	Local Description				
Cause					
Fuel Model/Conditions					
Current Weather					
Predicted Weather					

Availability of Resources	

DECISION CRITERIA CHECKLIST

Decision Element	Yes	No
Is there a threat to life, property, or resources that cannot be mitigated?		
Are potential effects on cultural and natural resources outside the range of acceptable effects?		
Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Agency Administrator?		
Is there other proximate fire activity that limits or precludes successful management of this fire?		
Are there other Agency Administrator issues that preclude wildland fire use?		

The Decision Criteria Checklist is a process to assess whether or not the situation warrants continued wildland fire use implementation. A "Yes" response to any element on the checklist indicates that the appropriate management response should be suppression-oriented.

Recommended Response Action (check appropriate box)	NO-GO (Initial attack/suppression action)	
	GO (Other appropriate management response)	

Signature	Date

Wildland Fire Situation Analysis (WFSA)

Section I, WFSA Information Page (*This page is completed by the Agency Administrator(s).*

A. Jurisdiction(s): *Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.*

B. Geographic Area: *Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.*

C. Unit(s): *Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.*

D. WFSA #: *Identify the number assigned to the most recent WFSA for this fire.*

E. Fire Name: *Self-explanatory*.

F. Incident #: *Identify the incident number assigned to the fire*.

G. Accounting Code: *Insert the local unit's accounting code.*

H. Date/Time Prepared: *Self-explanatory.*

I. Attachments: *Check here to designate items used to complete the WFSA. "Other could include data or models used in the development of the WFSA. Briefly describe the "other" items used.*

I. Wildland Fire Situation Analysis	
To be completed by the Agency Administrator(s)	
A. Jurisdiction(s)	B. Geographic Area
C. Unit(s)	D. WFSA #
E. Fire Name	F. Incident #
G. Accounting Code:	
H. Date/Time Prepared _____@_____	
I. Attachments	

- Complexity Matrix/Analysis *
- Risk Assessment/Analysis *
  Probability of Success *
  Consequences of Failure *
- Maps *
- Decision Tree **
- Fire Behavior Projections *
- Calculations of Resource Requirements *
- Other (specify)

*Required

**Required by FWS

Section II. Objectives and Constraints (*This page is completed by the Agency Administrator(s).*

A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints, which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II. Objectives and Constraints

To be Completed by the Agency Administrator(s)

A. Objectives (Must be specific and measurable)

1. Safety

   - Public

   - Firefighter

2. Economic

3. Environmental

4. Social

5. Other

B. Constraints

Section III. Alternatives (*This page is completed by the Fire Manager and/or Incident Commander.)*

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.

B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."

C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

D. Final Fire Size: Estimated final fire size for each alternative at time of containment.

E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.

F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

G. Risk Assessment: Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.

I. Map: A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III. Alternatives (*To be completed by FMO / IC*)			
	A	B	C
A. Wildland Fire Strategy			
B. Narrative			
C. Resources Needed			
Handcrews			
Engines			
Dozers			
Airtankers			
Helicopters			
Other			
D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			
G. Risk Assessment			
- Probability of Success			
- Consequence Of failure			
H. Complexity			
I. Attach maps for each alternative			

Section IV. Evaluation of Alternatives (*This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.)*

A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. (Those listed are defaults only – not all will be applicable to every fire – add or delete as appropriate for each incident.) Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of:
Pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. Evaluation of Alternatives			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
A. Evaluation Process	A	B	C
Safety Firefighter			
Aviation			
Public			
Sum of Safety Values			
Economic			
Forage			
Improvements			
Recreation			

Timber			
Water			
Wilderness			
Wildlife			
Other (specify)			
Sum of Economic Values			
Environmental			
Air			
Visual			
Fuels			
T & E Species			
Other (specify)			
Sum of Environmental Values			
Social			
Employment			
Public Concern			
Cultural			
Other (Specify)			
Sum of Social Values			
Other			

Section V. Analysis Summary (*This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.)*

A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.

B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

Section IV. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) signature is mandatory.

V. Analysis Summary			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
Alternatives	A	B	C
A. Compliance with Objectives			
Safety			
Economic			
Environmental			
Social			
Other			
B. Pertinent Data			
Final Fire Size			
Complexity			
Suppression Cost			
Resource Values			
Probability of Success			

Consequences of Failure			

C. External / Internal Influences

National & Geographic Preparedness Level

_____

Incident Priority

_____

Resource Availability

_____

Weather Forecast (long-range)

_____

Fire Behavior Projections

_____

National & Geographic Preparedness Level

_____

Incident Priority

_____

Resource Availability

_____

Weather Forecast (long-range)

_____

Fire Behavior Projections

_____

VI. Decision

The Selected Alternative is:

_____

Rationale:

_____ _____

Agency Administrator's Signature Date/Time

Section VII. Daily Review (This Section is completed by the Agency Administrator(s) or designate.)

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review (This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.).

VIII. Daily Review

To be completed by the Agency Administrator(s) or Designate

Selected to be reviewed daily to determine if still valid until containment or control

			PREPAREDNESS LEVEL	INCIDENT PRIORITY	RESOURCE AVAILABILITY	WEATHER FORECAST	FIRE BEHAVIOR PROJECTIONS	WFSA VALID
Date	Time	By						

If WFSA is no longer valid, a new WFSA will be completed!

VIII. Objectives Final Review

The elements of the selected alternative were met on:

_____ _____
Date Time

By:_____
(Agency Administrator(s)

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response "yes" or "no."

2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.

3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.

4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

GLOSSARY OF WFSA TERMS

Potential for blow-up conditions - Any combination of fuels, weather, and topography excessively endangering personnel.

Rate or endangered species - Threat to habitat of such species or, in the case of flora, threat to the species itself.

Smoke management - Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Extended exposure to unusually hazardous line conditions - Extended burnout or backfire situations, rockslide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

Disputed fire management responsibility - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Have overhead overextended themselves mentally or physically - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.

FIRE COMPLEXITY ANALYSIS

A. FIRE BEHAVIOR: Observed or Predicted **Yes/No**

1. Burning Index (from on-site measurement of weather conditions predicted to be above the 90% level using the major fuel model in which the fire is burning. ___ ___

2. Potential exists for "blowup" conditions (fuel moisture, winds, etc.). ___ ___

3. Crowning, profuse or long-range spotting. ___ ___

4. Weather forecast indicating no significant relief or worsening conditions. ___ ___

Total: ___ ___

B. RESOURCES COMMITTED

1. 200 or more personnel assigned. ___ ___

2. Three or more divisions. ___ ___

3. Wide variety of special support personnel. ___ ___

4. Substantial air operation which is not properly staffed. ___ ___

5. Majority of initial attack resources committed. ___ ___

Total ___ ___

C. RESOURCES THREATENED

1. Urban interface. ___ ___

2. Developments and facilities. ___ ___

3. Restricted, threatened or endangered species habitat. ___ ___

4. Cultural sites. ___ ___

5. Unique natural resources, special designation zones or wilderness. ___ ___

6. Other special resources. ___ ___

Total ___ ___

D. SAFETY

1. Unusually hazardous fire line conditions. ___ ___

2. Serious accidents or facilities.	___	___
3. Threat to safety of visitors from fire and related operations.	___	___
4. Restricted and/or closures in effect or being considered.	___	___
5. No night operations in place for safety reasons.	___	___
Total	___	___

E. OWNERSHIP

	Yes	No
1. Fire burning or threatening more than one jurisdiction.	___	___
2. Potential for claims (damages).	___	___
3. Conflicting management objectives.	___	___
4. Disputes over fire management responsibility.	___	___
5. Potential for unified command.	___	___
Total	___	___

F. EXTERNAL INFLUENCES

1. Controversial wildland fire management policy.	___	___
2. Pre-existing controversies/relationships.	___	___
3. Sensitive media relationships.	___	___
4. Smoke management problems.	___	___
5. Sensitive political interests.	___	___
6. Other external influences.	___	___
Total	___	___

G. CHANGE IN STRATEGY

1. Change in strategy to control from confine or contain.	___	___
2. Large amount of unburned fuel within planned perimeter.	___	___
3. WFSA invalid or requires updating.	___	___
Total	___	___

H. EXISTING OVERHEAD

1. Worked two operational periods without achieving initial objectives.	___	___
2. Existing management organization ineffective.	___	___
3. IMT overextended themselves mentally and/or physically.	___	___
4. Incident action plans, briefings, etc., missing or poorly prepared.	___	___
Total	___	___

Signature_____

Date_____ Time_____

Limited Delegation of Authority

LIMITED DELEGATION OF AUTHORITY

To: _____, Incident Commander

From: Superintendent, George Washington Carver National Monument

Subject: Limited Delegation of Authority

As of _____hours, on this date _____, I have delegated limited authority to manage the _____ fire in the George Washington Carver National Monument.

As Superintendent I have ultimate responsibility for protection of the George Washington Carver National Monument's resources and the lives of the visitors and employees. Your expertise in the area of wildland fire incident management will assist me in fulfilling that responsibility during the present situation. My considerations for management of this fire are:

1. Provide for firefighter, visitor, resident and neighbor safety.

2. I would like the fire managed using the most appropriate strategy that foremost considers, safety, economic cost, and probability of success and consequences of failure. The selected strategy should be implemented using minimum impact management tactics.

3. Key cultural features requiring priority protection are:
_____
_____
_____
_____
____

4. Key resource considerations are:
_____
_____
_____
_____
____

5. Restrictions for suppression actions are: no tracked or wheeled vehicles in the following areas:

_____
_____
_____
___

except when human life is at immediate risk. Helicopters, powersaws, portable pumps, and leaf blowers may be used as required. Chemical retardant is authorized as stipulated in the Fire Management Plan.

6. My agency Advisor/Representative will be:

7. Manage the fire cost effectively for the values at risk.

8. Provide training opportunities for park and local firefighters to the extent possible.

9. Minimize disruption of visitor access to park consistent with pubic safety.

_____
Superintendent, Wilson's Creek National Battlefield

_____
Date